SUBSCRIPTIONS FOR VOL. VI. ARE NOW DUE.

See **IMPORTANT NOTICE** *on page* 380.

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SCIENCE-GOSSIP

AN ILLUSTRATED MONTHLY RECORD OF

Nature, Country Lore & Applied Science.

EDITED BY

JOHN T. CARRINGTON,

ASSISTED BY

F. WINSTONE.

SPRING

SUMMER

AUTUMN

WINTER

LONDON

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"Any one study, of whatever kind exclusively pursued, deadens in the mind the interest, nay, the perception, of any others."

—*John Henry Newman.*

"Steadily, unflinchingly, we strive to pierce the inmost heart of nature. From what she is to reconstruct what she has been, and to prophesy what she yet shall be, veil after veil we have lifted; and her face grows more beautiful, august, and wonderful with every barrier that is withdrawn."

—*Sir William Crooks, F.R.S.*

Our Annual Greeting.

It is with exceptional pleasure we this year pen our Annual Greeting to our readers—the pleasure of success. Since the commencement of the present volume, much has happened in favour of our magazine. With the introduction of new capital, an unfortunate agreement which sadly fettered its progress, has been ended. We are now in an independent position with our own offices. One of our first resulting discoveries has been, that Science-Gossip is far more popular and has a wider circulation than we knew; consequently with the coming volume we hope to make some further improvements. We shall begin with the paper on which Science-Gossip is printed, giving our subscribers in the next volume a better quality, thus enabling our new printers to produce the illustrations more successfully. These have latterly been increased in number, and we hope with extended support from subscriptions, to still further develop the pictorial side of the journal.

With other changes comes the official recognition of Miss Flora Winstone, as Assistant Editor. This lady for several years past has largely assisted in the editorial work, and in the absence abroad of the Editor, has on several occasions brought out Science-Gossip. The departments of Applied Science and Physics will be benefited by this lady's editorial influence. We have to regret the retirement of Mr. John H. Cooke as Departmental Editor of Microscopy. To him our thanks have already been tendered for his past interesting communications, but are again renewed. His place has been generously filled by Mr. F. Shillington Scales, F.R.M.S., a well-known microscopist, and one of much enthusiasm in several sections of that science. We expect his department will in future become even more popular and important than latterly.

Sincere thanks are also due to our other honorary Departmental Editors who have so ably conducted their respective subjects during the past year. Our readers will have observed that a new department has been created for Physics, managed by Mr. James Quick, whose exceptional opportunities and ability will be of great advantage, for keeping well informed, those interested in novel physical matters. To this gentleman our hearty thanks are also due.

In conclusion we venture to urge on our readers and subscribers the necessity of rallying round their "old favourite Science-Gossip." Hitherto the proprietors have found the property a labour of love, not to say a severe tax from a financial point of view. Now that position is being altered, it is intended to share the prosperity with present and future supporters, by increased improvements in the Magazine.

May, 1899.

Editor.

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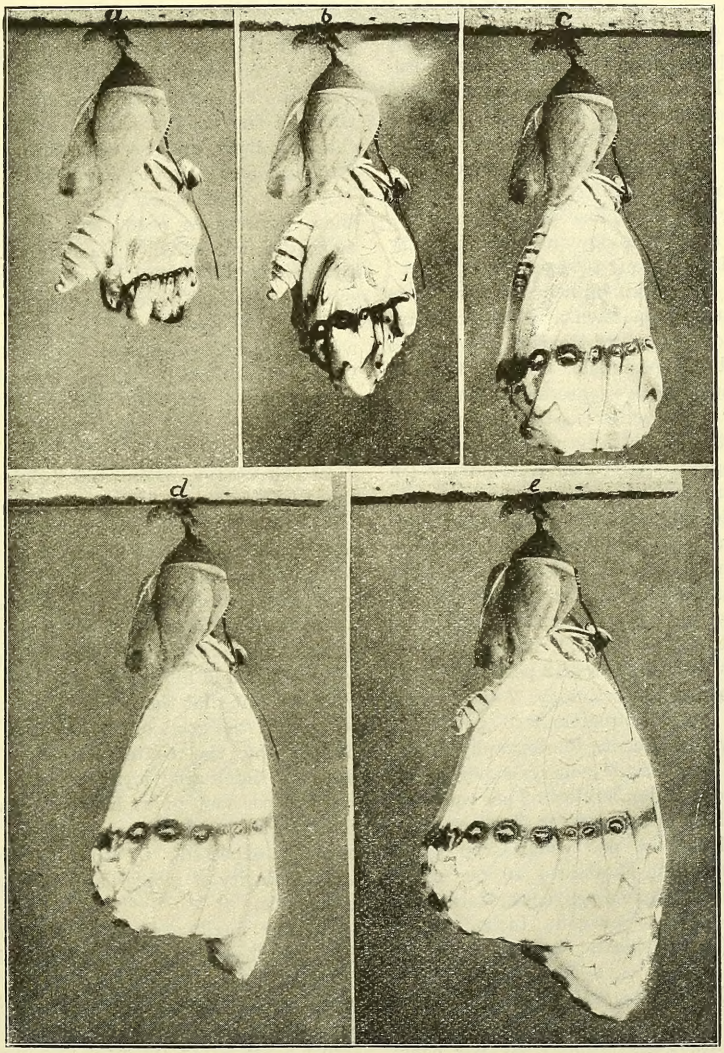
EMERGENCE OF A BUTTERFLY.

By E. Duckinfield Jones, C.E.

HAVING been much interested in photographing the development of the wings of *Morpho epistrophis* on its emergence, it has occurred to me that perhaps you might like to have the series for Science-Gossip.

however, it kept up a continual slight twisting motion of the body for the first minute, and it was only at the end of that time that I could get my first plate exposed.

Fig. *a* was taken one minute after emergence;



Morpho Epistrophis.
a, 1 minute after emerging; *b*, 3 minutes after; *c*, 5 minutes after; *d*, 9 minutes after; *e*, 15 minutes after emergence. All ⅘ natural size.

I observed the butterfly crack the shell and emerge from the chrysalis, and, having everything in readiness, was prepared to take my first photograph as soon as the insect settled itself in position with the wings hanging down. I found,

fig. *b* was taken three minutes after; fig. *c* five minutes later; fig. *d* nine minutes after; fig. *e* fifteen minutes after emergence from the pupa.

In fifteen minutes the wings were full size, but still perfectly flaccid. An hour later the

wings are nearly firm enough for flight; but, if undisturbed, the insect does not fly for three or four hours after emergence.

The constant motion of the butterfly after emergence continues for a much longer time in some species than in others. I tried a short time ago to get a good series of *Dynastor napoleon;* but the movement made it impossible to get a photograph till the wings were fully extended.

Castro, Parana, Brazil,
February, 1899.

STATISTICS OF THE NATURALIST'S DIRECTORY.

By Dr. G. H. Bryan, F.R.S.

A ROUGH tabulation of the names in the "Naturalist's Directory for 1899" (1) according to subjects, leads to some interesting statistical facts. By comparing the numbers of pages devoted to the principal divisions of natural science, we find that these are represented in the Directory roughly in the following proportions:—Zoology 58 per cent., Microscopy 12 per cent., Botany 14 per cent., Geology and Palaeontology 12 per cent., Miscellaneous 3 per cent.

Passing now to special branches of study we find that in a large proportion of cases these are not specified. Confining our attention, however, to those indicated as specialists, we find that in Zoology their subjects are represented roughly in the following proportions:—Lepidoptera 24 per cent., Ornithology 24 per cent., Mollusca 14 per cent., Oology 10 per cent., Entomology (in general) 8 per cent., Entomology (special orders other than Lepidoptera or Coleoptera,) 8 per cent., Coleoptera 7 per cent., various Vertebrates 3 per cent., various Invertebrates 1 per cent., miscellaneous 2 per cent.

In Microscopy the proportions are roughly as follow:—Pond life 19 per cent., Vegetable Physiology 16 per cent., Foraminifera 12 per cent., Diatoms 11 per cent., Bacteriology 7 per cent., Biology 6 per cent., Entomology 6 per cent., Marine Zoology 6 per cent., Photography 6 per cent., Fungi 4 per cent., Geology 4 per cent., Sponges 2 per cent., other subjects 2 per cent.

For Botany the proportions are:—Phanerogams 40 per cent., Mosses 16 per cent., Cryptogams generally 11 per cent., Hepaticae 10 per cent., Fungi 7 per cent., Algae 6 per cent., Ferns and Vascular Cryptogams 4 per cent., Lichens 2 per cent., various (Agricultural, Fossil, &c.) 4 per cent.

Geology, Palaeontology, Mineralogy, &c., are distributed in the following proportions:—Geology 41 per cent., Palaeontology 26 per cent., Mineralogy 18 per cent., various special subdivisions 15 per cent.

The percentages are somewhat roughly calculated, as it hardly appeared worth while to go through the whole list of zoologists; but the results, derived from a considerable number of pages, will be sufficiently correct to give a general idea of the relative popularity of the different branches. Anyone caring to spend considerable time on the matter might easily tabulate the total numbers under each heading; but would "the game be worth the candle?"

Among other conclusions to be derived from these figures, we note that "Ornithology" is equally popular with "Lepidoptera." If "Ornithology" and "Oology" be added together and everyone marked "Entomology" be credited with including "Lepidoptera" in their range of study, a bare majority favours birds rather than butterflies. "Mollusca," which according to our arrangement includes those entered under "Conchology" and "Malacology," comes next in popularity.

In Microscopy, "Pond Life" claims the largest share of devotees, "Vegetable Physiology" the next, while the next two entries show that the past experiences of the present writer in cleaning foraminifera have not deterred as many, if not more, from studying these organisms than have overcome the difficulties of preparing diatoms. We should have expected Bacteriology and Photography to stand higher on the list. It is, however, evident that there are still plenty of microscopists of the good old sort, whose life is made happier by the contemplation of "things of beauty," which are "joys for ever."

Forty per cent. gives in Botany a large majority to the phanerogams, but not larger than might be expected. Of other branches of botany, the popularity of mosses, and nextly hepaticae, is noticeable.

In the next section the preponderance of Palaeontologists over Mineralogists is not greater than might be expected. The special sub-divisions include the geology of particular formations, glacial geology, metallurgy, etc.

Taken all round, the Directory shows a healthy indication that the amateur lovers of nature, for whom Science-Gossip was founded in 1864 and still represents, are yet among us in considerable numbers, and have not been by any means exterminated by the counter-attractions of laboratory science on one hand, and the bicycle and camera on the other.

Bangor, North Wales, March, 1899.

(1) "The Naturalist's Directory, 1899" 168 pp. 7¼ in. × 5 in. (London: L. Upcott Gill, 1899.) 1s.

ENGLISH BIRDS IN TASMANIA.

By Frank M. Littler.

THESE notes are written for the purpose of giving a short history of the efforts of several residents in this colony to introduce various species of English birds into our island home. Unfortunately, in several instances their labours have not been crowned with the success they deserved. At the southern end of the island, where the capital, Hobart, is situated, more species of birds have been introduced and established than at the northern end. Not that one end of the island is better suited for acclimatization than the other, but that some southern gentlemen who were interested in the matter took the trouble to import various species.

The most widely distributed and the best known of the imported birds is the English house sparrow. It was introduced into Launceston from Adelaide some thirty years ago, and it is thought they were brought here by mistake for hedge-sparrows. As might be expected, there was a great cry of protestation after they had thriven and multiplied. In many country districts the sparrows now do an enormous amount of damage to the grain crops, and are heartily detested by farmers, who do all they can to thin their ranks, but without any appreciable diminution in the numbers. In vegetable gardens, sparrows do considerable damage, as they are very fond of pulling up young peas. It must be added, however, that these birds appear to eat enormous quantities of the aphis blight off rose bushes, and other plants.

The next best-known birds are the English goldfinches, which have been here for some fifteen years or so. They are fairly numerous in Hobart and the surrounding country. Flocks of forty and fifty have been seen at a time. In Launceston, at the northern end of the island, they are not so numerous as in the south, but they extend over a larger area of country. In the south, goldfinches are found only for some fourteen miles round Hobart; whereas in the north they are to be seen in fairly large numbers some twenty miles from Launceston. At a place named Underwood, in the Upper Piper River district, these birds have recently become very numerous. There they are reported to do an enormous amount of good by feeding on the scale and other insect pests with which the trees are infested. At Entally, about eight miles from Launceston, they are also fairly numerous. Sometimes young goldfinches are obtained by fixing a cage over the nest when it is found in a garden. Then the old birds will continue to feed their young through the wires of the cage.

About the year 1880, Dr. E. L. Crowther, of Hobart, purchased a number of starlings in New Zealand and brought them to Hobart, where he liberated seventy-five. These birds are the common English starling imported into New Zealand, and from thence brought to Tasmania. They were promptly protected by law, and multiplied rapidly. Starlings are now plentiful in Hobart and the neighbouring districts, but southward have not spread below Lower Sandy Bay, about four miles down the River Derwent. Up that river they are found above Bridgwater, and inland about twenty miles, extending their range beyond Brighton; but have not yet reached Campania, a distance of twenty-seven miles. They have spread to Bellerive, on the east bank of the Derwent, but have not arrived at Sorell, fourteen miles away. The starlings may be seen in flocks of a hundred or more on grass paddocks hunting for grubs. These birds do an enormous amount of good by destroying countless numbers of these pernicious insect larvae. During the fruit season, however, starlings become such a nuisance by their depredations in the orchards that legal protection is practically abolished. Indeed, they are caught and frequently used instead of pigeons at shooting matches. For this purpose, I believe, they are captured by blocking up the holes by which they get under roofs and into barns or other like places, where many roost, and there taking them during the night. Starlings are not to be found in the northern end of the island, being evidently considered an undesirable importation from the south.

English skylarks are to be found in fair numbers about Risdon and Glenorchy, which places are but a few miles from Hobart. About thirty or forty years ago some birds of this species, imported from England, were liberated near New Town, but did not thrive. Within the last ten or fifteen years other imported birds have been liberated, which multiplied, and their descendants are now fairly numerous in the paddocks about New Town, Risdon, Glenorchy and Brown's River Road, but have not yet extended beyond these limits, an area of about ten miles long by three miles wide, being at present the only region occupied. In the northern end of the island some imported skylarks were liberated several years ago at St. Leonards, about five miles from Launceston. Around Cressy, twenty odd miles from Launceston, skylarks are rather plentiful, more so than at St. Leonards. The young birds are sometimes taken from the nest and reared in captivity. Twenty years ago some pheasants from England were introduced and liberated at New Town, but they soon fell a prey to "pot-hunters." Others were also introduced at Entally, where for a time they throve

remarkably well, at one period as many as ninety young birds being reared. They gradually disappeared, being either shot, or destroyed by vermin, notwithstanding that they were under the care of an experienced English gamekeeper. Sir Richard Dry also imported pheasants and partridges. Other young ones were reared on the Quamby Estate, near Entally, but they were all shot or destroyed.

A little time since a resident of the Midlands made two unsuccessful attempts to acclimatize grouse and partridges. At the time of writing, another effort is being made. Eggs have also been brought, to ascertain if they would remain fertile during the transit. One great drawback to the successful rearing of the game birds is the want of sufficient cover.

The acclimatization of some English birds in Tasmania has been very successful, and highly gratifying to those gentlemen who have taken the trouble to import new species to this island. The climatic conditions are eminently suited for Western European birds. The winters are not severe, and there is always a certain amount of insect food to be found. The climate generally is very salubrious and well fitted for the introduction and establishment of fauna and flora from a country whose climate in some respects resembles our own.

Launceston, Tasmania, December 1898.

CHAPTERS FOR YOUNG NATURALISTS.

(*Continued from page* 273.)

BRITISH TIGER-BEETLES.

By E. J. Burgess Sopp, F.E.S.

Genus Cicindela.

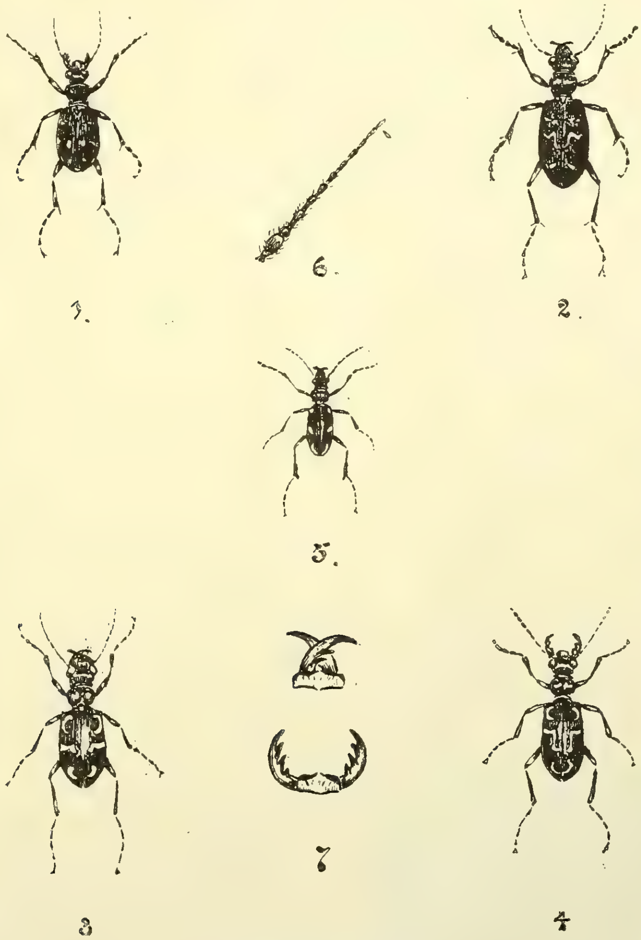
It has been said that we must first catch our hare before we can cook it, and it is likewise necessary to catch our tiger-beetles before we can examine them. In either case the exercise of a good deal of patience, cunning, or activity is usually required; indeed, more often than not, a combination of all three is indispensable to success. It is to be feared the old and simple method recommended to us in our youth—in which a pinch of salt plays a prominent part—is scarcely likely to be of more assistance to us in the one case than in the other. Unlike the Necrophora, of which I treated in a former chapter (*ante*, p. 271), the Cicindelidae are exceedingly quick of movement, and one would be quite as likely to catch a weasel asleep as a tiger-beetle, especially should the day be bright and hot.

It is often puzzling to account for the popular names which some of our insects bear, but this difficulty does not confront us in the present instance, the genus *Cicindela* occupying a position amongst insects analogous to that held by the Felidae among the higher animals. The tiger-beetles are carnivorous and highly predaceous in their habits, combining great strength with extreme activity. They are also equally ferocious in both the larval and imago forms. Possessing at the same time keen appetites, and accommodating digestive apparatus, their close proximity must be a very unpleasant, not to say dangerous, circumstance for weaker and less well armed dwellers in their neighbourhood. In general form, and sculpture, they are graceful to a degree; their colour is bright, and the markings as bold and effective as in the mammals after which they are named. The head is large, with prominent eyes and strong jaws, which, together with powerful organs of locomotion, render the beetles eminently adapted to their mode of life. The mandibles which, as in most predatory forms, are long and curved, end in sharp points. They are also possessed of a series of teeth along their keen inner edges. When closed they overlap or cross one another, and are thus well suited for holding or tearing their prey. In addition to being thus equipped, the inner lobe of the maxillae or lower jaws is furnished at the end with a movable hook. This articulation serves to distinguish the *Cicindela* from allied beetles, in which the hook is always fixed. In mastication the upper and lower jaws act alternately, one set closing as the other opens. The muscles of the mandibles and neck are well developed, and any insect unfortunate enough to be seized would have a poor chance of escape. I had occasion to refer, in the article just mentioned, to the strength of the neck muscles of the burying beetle, and it may not be out of place to remark that amongst the insects are to be found, relative to size, some of the strongest members of the animal kingdom. In connection with this subject a very interesting experiment was carried out by Canon Fowler on a long-horn beetle (*Rhagium inquisitor*), which is not uncommon in many districts in decaying oak, fir, and other trees. Having tied weights in pieces of paper he held the insect so that it could seize and hold the various packets if so inclined. He says: "The greatest weight raised was five ounces, or 2,187·5 grains. The beetle weighed exactly four grains in a chemical balance, so that it supported in its jaws five hundred and forty-seven times its

own weight. This is in the same proportion as if a man of eleven stone were to support thirty-seven and a-half tons, a fact that shows clearly the enormous strength not only of the jaws, but also of the neck and other muscles of the beetle" ("Entomologists' Monthly Magazine," vol. xviii., p. 18).

In all but one of our British tiger-beetles, the thorax is broader than long, the elytra in every case entirely covering the abdomen. The wings can be folded and unfolded with greater celerity in this than in any other genus of Coleoptera and the *Cicindela* exhibit more the quickness of flies than of beetles in this respect. The legs are long and well fitted for speed, and whether on the ground or in the air, the actions of the tiger-beetle are characterized by extreme rapidity of movement.

The larvae are of a dirty white or yellowish hue, with the head and legs of a darker shade. The head, which is rather flat, is armed, as in the perfect insect, with strong sharp jaws. The dorsal surface of the eighth segment is much raised, and provided with two hooks, which give the grubs a very peculiar appearance. These larvae bore holes in the ground from ten to twenty inches in depth, and of rather greater diameter than themselves. The tunnels are, as a rule, sunk vertically throughout their greater length, and are then curved at the bottom so as to form a kind of horizontal chamber. The manner in which they are constructed is described by Westwood in his notes on the larva of *C. campestris.* With its powerful jaws, and by the help of its legs, the grub detaches the pieces of sand or earth, which are then carried to the top of the burrow on its broad head and ejected. Having completed its habitation, the larva next



British Tiger-Beetles.

Fig. 1, Cicindela campestris. Fig. 2, C. sylvatica. Fig. 3, C. hybrida. Fig. 4, C. germanica. Fig. 6, Antenna enlarged. Fig. 7, Jaws, open and closed.

does its very best to satisfy an apparently insatiable appetite, and in order to accomplish this, much cunning is shown. Working its way by means of legs and hooks to the top of the burrow, it stops up the aperture with its broad flat head, which may be either on a level with the surface of the ground or slightly lower, so as to form a shallow depression. It is when in this position the peculiar formation of the raised segment above referred to is most strikingly illustrated; the hooks, which are bent backwards, serving to keep the larva firmly fixed in the attitude described, so that the whole of its attention can be devoted to the business in hand, which consists in pouncing upon such small creatures as may be so unfortunate as to stroll within reach. Should any insect wanderer unheedingly step or slip into the slight depression formed, the wily grub instantly drops to the bottom of its tunnel, the unsuspecting victim, of course, falling too, where it is promptly seized and devoured. Then the larva again takes up its position at the orifice, lying in ambush with appetite seemingly whetted rather than appeased. When full grown the grub closes the entrance to its home, retires to the subterranean cell and assumes the pupal form, in which state it remains for a short period in blissful quiescence, until ready in the last act to reappear in an entirely new character, with a costume of glorious colour, to play the part of a perfect tiger-beetle.

The Cicindelidae belong to the great tribe of carnivorous and predaceous beetles known as the Adephaga, which, for convenience, is often considered with two sub-tribes to contain the terrestrial and aquatic forms, termed respectively the Geodephaga and Hydradephaga. In addition to the Cicindelidae, numbering over nine hundred species, the Geodephaga also includes the large family Carabidae, over eleven thousand species of which are now known to science. The Cicindelidae comprise two genera—*Tetracha* and *Cicindela*; the former being twilight-loving or nocturnal in their habits, the latter preferring the hottest sunshine. The genus *Cicindela* is cosmopolitan, and contains over four hundred and fifty species, but of these less than half-a-dozen are indigenous to the British Islands, and one only can be said to be common and generally distributed throughout the greater part of the kingdom.

Cicindela campestris, the field tiger-beetle, ranges from half to nearly five-eighths of an inch long. In occasional specimens the colour varies considerably from the normal, but the type hue is some shade of rich dark green, with the basal joints of antennae, front and hinder borders of thorax, margins of elytra, and femora and tibia of the legs of a brilliant lake or copper-red colouring; the tarsi are often bright green, shot with ruby red. Each elytron bears five white marks, which, although varying somewhat in size and distinctness in certain individuals, are usually plainly discernible. The largest of these, situated on the disc, is surrounded by a black line, the others being arranged from the apex round the outer margin of each wing-case. A black form of this beetle (var. *funebris*) is found in the Clyde district of Scotland, but is of decidedly rare occurrence. *C. campestris* is readily known from all other British species, except *C. germanicus*, by its colour and markings, whilst from the latter its size alone will easily serve to distinguish it. The green tiger-beetle is generally common all over the kingdom, but, as is the case with all beetles, is much more plentiful in some districts than in others. It frequents sandy places, where it may be found during spring and early summer about turf-banks and bare patches on heaths and commons, on ploughed land, &c., in which situations, when not engaged in more serious pursuits, like the policeman's coster in the "Pirates of Penzance," it "loves to lie a-basking in the sun."

Cicindela sylvatica, the wood tiger-beetle, is the largest of our native species, and varies in length from five-eighths to three-quarters of an inch, its long legs serving to give it the appearance of being a still larger insect. The general colour is a rich chocolate or dark-brown hue, very metallic, and with purplish or violet reflections; which colour is often replaced in the tibia and tarsi by bright blue or green. The elytra are strongly punctured, and exhibit a series of larger pits or depressions, which give the upper surface a rough-looking appearance. They are also boldly decorated with light-yellow markings, which shape themselves into a kind of pattern, and present a very pleasing effect. The antennae, as in all the genus, are filiform or thread-like, and consist of eleven joints, the basal four being bright and highly-polished, the apical ones dull and less pubescent. Apart from its average larger size, *C. sylvatica* may be at once recognised by the series of dorsal pits and form of the markings on its wing-cases, as well as by the fact that the labrum is always concolorous with the head, whereas, in all our other species, it partakes of some shade of yellow. It is a decidedly local beetle, but not uncommon where found, and may be looked for on bare patches or banks near woods, on sandy heaths, and in similar situations—more especially in the South of England.

Cicindela hybrida is, on an average, rather larger than *C. campestris*, and smaller than our last beetle. In colour it is of a warm bronze-brown, shot with green, purple, or ruby reflections. The elytra are closely covered with small prominences, which are of so slight an elevation as to be little more than a roughness of the chitinous casing, but which are, nevertheless, plainly discernible with an ordinary magnifying glass. They are also marked with yellow stripes at the shoulders, middle, and apex.

The basal joints of antennae, anterior and posterior margins of thorax, and legs, often exhibit a brilliant green, purple, or copper-red coloration, whilst the under side, which is very polished, displays similar gorgeous hues. It differs from *C. campestris* in colour, and from *C. sylvaticus* in the pattern of the markings, and lack of pits on the elytra, as well as in having the labrum yellow. *C. hybrida* frequents the bare dunes or sand-hills which form such a striking feature on many of our coasts. It is always local, and as with *C. germanica* and many other beetles, its variation in abundance during a sequence of years is very marked; in some seasons appearing plentifully, in others being exceedingly scarce. Its dark-bronze hue, contrasting with the white sand, renders it a conspicuous object from a distance; but it is one thing to see a tiger-beetle and quite another to catch it. My own experience is that the obtaining of a series of *C. hybrida* on a hot day in May, over the steep slopes of loose sand which characterize our Aeolian dunes is productive of much exercise, and rather more than a genial warmth. A net is almost a necessity, and even thus equipped much strategy is requisite in order to effect a capture. The beetles should be approached so that no shadow is thrown towards them, and if possible against the wind and uphill. Although quick to take flight they never go far at a time, especially should the day be dull. With the exception of a record from the Tay district, *C. hybrida* does not appear to be found north of the Tweed, but is not uncommon at many places round the English and Welsh coasts.

Cicindela maritima much resembles the preceding insect, of which it is regarded by most coleopterists as a variety only; but the differences appear sufficiently well marked and persistent to warrant its being considered a separate species. It has at least as much claim to specific rank as many beetles which at present enjoy that distinction. In size it is slightly smaller and narrower than *C. hybrida,* and also, as a rule, somewhat duller and more variable in colour. It can always be distinguished from that species by having the middle band bent down at the centre towards the apex, whereas in *C. hybrida* it is merely waved; the forehead, too, is much less convex than in the latter beetle. It is a local insect, and found under the same conditions as the last.

Our remaining species *C. germanica* is known from all the other tiger-beetles by its small size, never exceeding from six to seven-sixteenths of an inch in length. In shape, too, it is more cylindrical, and has the thorax distinctly longer than broad. The ground colour resembles that of *C. campestris,* being usually of a rich dull green, which is, however, in *C. germanica,* often shot with ruby- or copper-red. As is the case with the common green tiger-beetle, occasional individuals in this species also exhibit very considerable variation from the normal hue. Each elytron bears three white marks—a spot at the shoulder, another about the middle, but close to the outer margin, and a short, crescent-shaped patch along the apex. These are, however, very liable to vary, the first-named being sometimes obsolete, and the second and third occasionally running together so as to form a continuous white border from about the middle to the apex of each wing-case. Unlike the other species, *C. germanica* shuns dry situations, and seldom uses its wings. It frequents damp, swampy places and salt marshes, where it may be seen on bright, hot days running with great speed over the wet ground, its long, slender legs moving with astonishing rapidity. This is an extremely local and usually a rare beetle, occurring in only a few restricted places in the South of England. It was formerly—and possibly still is—not uncommon in some years in a very circumscribed area near Swanage, in Dorsetshire; but Black Gang Chine, in the Isle of Wight, now appears to be almost its only stronghold.

Tiger-beetles, being strictly carnivorous in both the larval and imago forms, they neither feed upon nor damage crops of any description, but rather render service to man by preying upon various kinds of injurious insects and grubs. We should, therefore, regard them as friends, and never ruthlessly injure or destroy them.

Hoylake, Cheshire.

TORTOISE GRAECA.—I have a specimen of the Greek tortoise, so frequently hawked in the London streets, which deposited two eggs in my garden last September. I enclose a photograph of it and the eggs. In its native country it scrapes a hole in the ground before laying its

GREEK TORTOISE AND EGGS.

eggs; but in the case of my specimen, it simply covered them with leaves. These tortoises are less commonly seen in London than formally, because they are now sold in the markets of Greece as edible delicacies.—T. E. FRESHWATER, F.R.M.S., 3, *Fleet Street, London, E.C.*

BRITISH FRESHWATER MITES.

By Charles D. Soar, F.R.M.S.

GENUS *CURVIPES* KOENIKE.

(*Continued from page* 330.)

X.—*Curvipes longicornis* Koch.

Piersig says this mite is the same species as *C. nodatus*. In this I must differ from him. The colour is so divergent, and the adult size so small when compared with *C. nodatus*, that I do not think one can come to any other conclusion than that they are two distinct species of the same genus. The points of difference are constant in several specimens that I have taken from different localities. If the reader will refer to Koch's great work (Deutschlands Crust., &c., heft 8, figs. 11-12), *Nesaea coccinea*, which is synonymic with *C. nodatus*, it will be seen what a beautifully coloured mite is this, and that it exactly corresponds in the colouring with our British specimens of *C. nodatus*. Then, if reference is made to heft 9, figs. 14-15 of the same work, which indicate *N. longicornis*, a beautiful representation of our British *Curvipes longicornis* will be found.

Female: Body.—Oval in form. Length about 1·20 mm.; width, 0·92. Colour, a pale yellow, with dark brown markings and a light yellow T-shaped piece on the dorsal surface. Eyes rather large and dark red.

Legs.—First legs about 1·04 mm.; fourth pair about 1·60 mm. Colour, a pale yellow for the first two or three joints, then gradually turning into a pale blue towards the extremities.

Epimera.—Arranged in much the same manner as shown in (fig. 2) *C. nodatus*.

Palpi.—About 0·50 mm. in length, and the same as shown at fig. 5, in shape. I cannot find any difference in the structure of this mite and that of *C. nodatus*, but the difference in the size and colour is so marked and so constant that I feel strengthened in my opinion in regarding this as a distinct species.

Genital Plates.—These have two discs much larger than the others (fig. 6) and numerous small ones, which vary in number, but each plate has about twenty discs.

Male.—About 0·90 in length. Colouring is the same as that of the female, with the difference that the male has a red T-shaped piece on the dorsal surface, whilst it is yellow in the female. I should not like to say that this is constant; but Koch, in his drawing, shows the same distinction. I have only taken four males of this species, but the colouring is the same in all cases. The palpi of the male are 0·48 mm. in length.

XI.—*Curvipes circularis* Piersig.

Body.—A broad oval. Length about 1·40 mm. Width about 1·18 mm. Colour, yellow, with darker yellow and brown markings on the dorsal surface. Fig. 37 shows the ventral area.

Legs.—A darker yellow than the body and inclined to red. First legs, about 1·20 mm. in length. The fourth legs are about 1·50 mm.

Epimera.—Very small (fig. 37) in comparison with the surface of the body.

Palpi.—About 0·50 mm. in length. There is

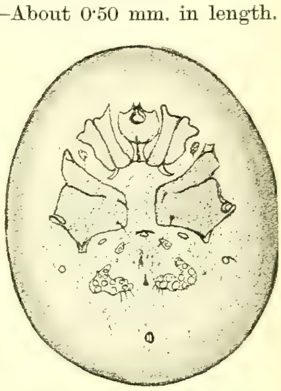


Fig. 37, *C. circularis*.—Female, ventral surface.

a difference, as is usual, in this part. The spines on the second and third joints are plumose. Fig. 38 is drawn from the inner side of the right palpus. There are three small pegs in a row, visible on that side of the palpi.

Genital Plates are also different from the previous species of *Curvipes*. They are quite

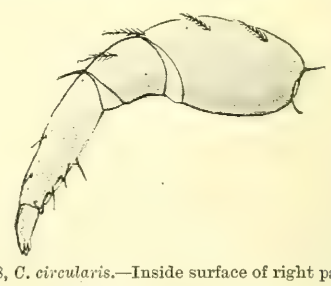


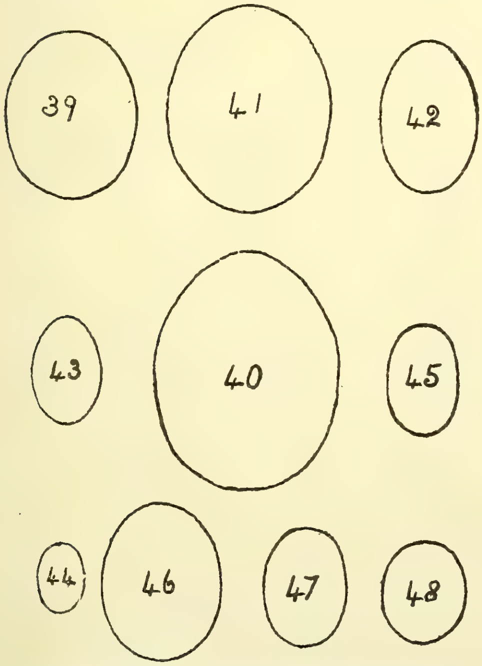
Fig. 38, *C. circularis*.—Inside surface of right palpus.

different from fig. 32, in having the anterior disc on a small plate (fig. 25) by itself. The form of the genital plates in *Curvipes rufus* is much nearer to that of this species, but the plates are of quite a different shape; the plates in *C. circularis* being sickle-shaped.

Localities.—This mite is not common. I have not seen more than five specimens; I have not yet found a male specimen of this species.

I have not adopted any particular scale for the figures in these articles, but have drawn them in

size sufficient to show all the necessary details. As, however, I think the eye can convey the idea of size by drawings better than the mind can grasp by the thought of millimetres, the differences in the sizes of the British mites of the genus *Curvipes* known to me are shown by a series of ovals represented by figs. 39-48. These will, I think, convey the impression intended. I have endeavoured to give the average size of all the mites in the text by measuring several specimens of the same species, adding the sizes all together and dividing by the number of mites measured. In several cases my measurements do not agree with Piersig's; but this may be only due to local



RELATIVE SIZES OF SPECIES OF CURVIPES.
Fig. 39.—*C. nodatus.* Fig. 40—*C. longipalpis.* Fig. 41.—*C. uncatus.* Fig. 42.—*C. fuscatus.* Fig. 43.—*C. rufus.* Fig. 44.—*C. conglobatus.* Fig. 45.—*C. obturbans.* Fig. 46.—*C. carneus.* Fig. 47.—*C. longicornis.* Fig. 48.—*C. circularis.*

differences. All Piersig's measurements are based on water-mites found in Germany, whereas mine are from mites found in Great Britain.

If any collector of water-mites has been fortunate enough to find in this country other species of the genus *Curvipes* than those I have recorded, it is to be hoped that a note of its occurrence will be sent to SCIENCE-GOSSIP. Doubtless several more are yet to be discovered, as the list of British species is far less in number than those of the German fauna. This discrepancy is probably due to the paucity of students of water-mites in these islands, and the fact that much of the freshwater has consequently not yet been searched.

20, *Cortayne Road,*
Hurlingham, London, S.W.

INDIARUBBER.

By A. B. STALL.

THE ever-increasing demand for indiarubber is stimulating collectors to find an adequate and permanent supply, and the most likely parts of Africa are at present being searched for fresh sources. The demand has risen in this country from 23 tons in 1830 to nearly 20,000 tons last year, with a value of £4,000,000. Other countries import considerable quantities, but all of them are far behind this amount. The rapid growth and enormous expansion of a trade which may yet be said to be only in its infancy is remarkable. The purposes for which rubber is now used are innumerable; tyres for the cycling trade alone demand an enormous supply, and there is scarcely an art or manufacture nowadays in which it does not play an important part.

The species of plants which yield the milky juice from which the substance called caoutchouc, better known as indiarubber, is obtained are numerous, and distributed over almost every part of the tropical regions; yet they seem to be confined to the spurge, nettle, and dogbane families. The production of rubber in its wild state is rapidly diminishing, and this is due somewhat to the destructive methods the natives use in extracting the juice. There are several systems of preparing the rubber, the essential part consisting in separating the water, of which there is a large quantity, from the milky juice. This is done either by evaporation by means of a heating arrangement, or obtaining the coagulation of the rubber by certain chemical processes. Rubber produced in the latter way is not so good. A French writer says:—"Le procédé est ingenieux, mais les resultats de son application sont mauvais." A mechanical method for extracting the rubber on the same principle as the cream separator has lately been invented, and is likely to prove of considerable value.

The cultivation of rubber-yielding plants is now attracting attention, and to Great Britain this is a matter of special importance, for it is to this country that nearly one-half of all the rubber collected is sent. The prospects of obtaining larger supplies in the future from cultivated trees are fairly promising, and in selecting sites for plantations preference is being given to localities where the trees are already growing. It is found that where rubber trees are cultivated under suitable conditions, they will yield a larger quantity of milk than wild trees, and the rubber, from the greater care and attention paid to it, is more uniform in quality, and consequently obtains a higher price.

Para rubber produced from *Hevea brasiliensis*, one of the spurgewort family, is the most valuable of all the rubber trees, its price practically ruling the market. Its home is in Para, a vast region in

the valley of the Amazon, and the area known to produce this rubber in its wild state is more than nine times the size of Great Britain. This region not only produces the best quality of indiarubber, but more than one-third of the world's supply. The better qualities of this rubber are now so eagerly sought after for the markets of the United States and Germany, that this important industry is no longer a monopoly of this country. The plant has been introduced into India on a large scale. It is now well established in Singapore, Java, Africa, and the West Indies. It is no easy task to raise rubber plants which are indigenous to one place in another, even where the conditions are favourable so as to make them successfully productive. Yet, commercially speaking, the Para rubber tree is the most profitable that can be grown in the East.

Central American rubber, including that exported from Mexico, Guatemala, Panama and the western slopes of the Andes as far as Peru, is not much inferior to that of Para. It is produced from *Castilloa elastica*, one of the nettle family. With balls made from the rubber of this tree, Columbus noticed the natives playing when he landed in America 400 years ago, and similar rubber balls are still played with by the Indians in the valley of the Amazon. In fact, the use of rubber for domestic appliances was also familiar to the natives of Central and South America long before it was known to European nations. *Castilloa elastica* has an extensive geographical range, and is capable of existing under varied climatic conditions. It is a large-sized tree sometimes growing to a height of 180 feet, with a circumference of 15 feet. It grows wild along the coasts of Mexico from the sea-level to a height of 1,500 feet. A dry or rainy climate is equally suited to it, but a high and equable temperature which never falls below 60° Fahr. is essential. Plantations of this tree have been established in Mexico, and profitable harvests of rubber collected from them. One of the most important of these plantations is La Esmeralda. Sir Henry Nevill Dering, the British Minister in Mexico, states that rubber plantations of 100,000 trees do not cost more for cultivation during five years than £2,500, while the yield from the same the first time the juice is drawn would realise about £12,000, and this does not include the profit from vanilla, bananas, cacao, and other productive plants which can be cultivated in the space between the rubber trees. He estimates that a profit of 400 per cent. per annum might be drawn. His calculations, however are based upon trees only five years old, which is a much younger age than is advocated to tap them, although a fair yield may be obtained.

The Ceara rubber tree is another American plant, and probably the only one that offers any inducement for cultivation in other than their native countries. Neither this nor the Central American rubber has as yet been able to be cultivated with profit in the East. Ceara rubber is produced from *Manihot glaziovii*, another of the spurgeworts and named after Dr. Glaziou, who first sent specimens to this country. The tree is a native of north-east Brazil, and grows to a height of about 40 feet. From 200 to 300 tons of the rubber of this tree are imported annually to this country, but the quality of it varies according to the mode of tapping the trees and the care taken in its preparation. When pure it ranks next to Para rubber in value.

The only other American rubber of any importance is yielded by *Hancornia speciosa*, a dwarf tree with somewhat the habit of a birch and belonging to the dogbane family. When compared with the others, the possibility of acclimatising it for cultural purposes is small.

The most promising source of rubber now is Africa, where the development of the industry in certain parts is one of the most remarkable incidents in recent years. Up till lately all the rubber-yielding plants in Africa belonged to one genus, *Landolphia* of the dogbane family.

Since the discovery in 1894 of the valuable rubber tree, *Kicksia africana*, also one of the dogbanes, these practical difficulties have disappeared. The tree was first discovered in the colony of Lagos, and has since been found to be widely distributed in West Africa. It grows nearly 50 feet high, and each tree is estimated to yield annually about two pounds of rubber. The quantity collected in Lagos alone during 1895 attained a value of £270,000, representing an export of 2,270 tons. Owing, however, to the destructive methods of the natives in extracting the juice, the exports have greatly fallen off. The commercial value of the Lagos silk rubber, as it is called in the trade, stands high, and experiments are being made to establish regular plantations to try and make the industry permanent. The rubber of the *Kicksia* is of good quality, and the tree grows more vigorously than any other rubber-yielding tree. It is said that, after eight years, the *Kicksia* is in a condition to yield marketable rubber, and in West Africa the tree is more suitable for cultivation and more likely to be adopted than any of the American species.

More recently still another new source of rubber has been discovered in the Congo State. It is obtained from the underground stems of a small and somewhat herbaceous plant, *Carpodinus lanceolatus*, another of the dogbanes. The underground stems are rasped in water and yield rubber of an excellent quality. This plant is also available for cultivation, and is expected to give better returns than any of the rubber trees hitherto in use. It is probable, too, that other rubber-yielding plants may yet be discovered in

Africa, for the full extent of the sources whence this valuable product may be obtained is still unknown. In the world's commerce, Africa now occupies an important place, and as a source of indiarubber it is at present attracting the attention of Europeans. The value of the imports of African rubber into the United Kingdom in 1896 amounted to over £1,000,000, and of this nearly £850,000 was from British possessions.

5, Brighton Terrace, Joppa, Edinburgh.

INSTINCT OR INTELLIGENCE.

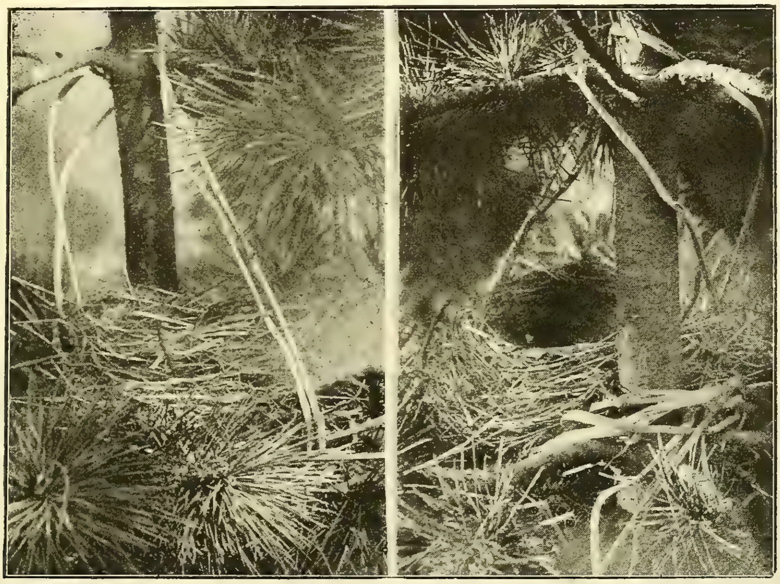
By W. W. Midgley, F.R.Met.S.

In Science-Gossip, at p. 304, Mr. R. Dickson-Bryson, B.A., in his able article on "Instinct" says: "Note, too, each species (of birds) has built on the same uniform plan from immemorial time." Early in the month a letter was sent me from a head-gardener at a residence some two miles west of Bolton, in which he described a remarkable song-thrush's nest, and invited me to go and see it. This I did, taking a camera with me. I found the birds had selected a young fir-tree, *Pinus sembra,* for nidification, placing the nest in the axils of two lateral branches, and against the trunk of the tree in the "instinctive" orthodox plan; plus, something fresh in thrush architecture. The grounds are exposed to the full force of south-westerly winds, and the gardener says he has often known instances of the nests of birds being overturned by the wind.

To prevent such a misfortune, this pair have adopted a plan whereby such an event is safeguarded. Utilising the dead stalks of last season's nettles, with bill and claws, they have fastened the ends into the nest and round the trunk of the tree, again fastening the other ends into the nest. Still further to guard against the equinoctial gales they have selected two of the longest stalks, slung them round the trunk at the nodes, about fifteen inches above the nest, and woven the ends into the sides of the nest so as to stay it. I enclose photographs showing these clever contrivances.

Surely here is an instance of something akin to intelligent design to overcome disasters to which these birds or their ancestors have been subject. The nest was finished and contained an egg at the time the photograph was taken.

Public Museums and Observatory, Bolton.



South Side. North Side.

Thrush's Nest with Protection Ties.

Distribution of Mollusca.—Mr. Wilfrid Mark Webb, F.L.S., has arranged to communicate to Science-Gossip a series of articles upon the distribution of the British land and freshwater mollusca. It is intended to illustrate the range of each species by a specially-prepared map of the British Isles. Mr. Webb appeals to our readers for the latest information as to the distribution of terrestrial and fluviatile mollusca of Britain; either as county lists, or isolated records or references to such. Mr. Webb has already a large amount of material towards the monograph; but it is desirable that the very latest information shall be included. Communications may be addressed to the office of Science-Gossip; or to Mr. W. Mark Webb, 2, The Broadway, Hammersmith, W.

SUCCULENTS AT KEW.

By E. H. Wilson.

(*Continued from page* 331.)

If we consider the Euphorbiacae, we shall find exactly parallel modifications. In *Euphorbia fulgens* we have a thin stem with well-developed, persistent leaves; in *E. splendens*, succulent stems and partially persistent leaves. *E. tirucalli* has a stout trunk, with whip-like branches, while in *E. abyssinica* and others we find thick, columnar stems, comparable with the cacti already mentioned. In all of them, leaves are developed, but they are merely transient. Most of the species have spines, but they are usually short. In *E. splendens* and *E. bojerii*, the stems are terribly spinescent, and the spines of *E. grandicornis* make one shudder to behold. Apart from the protection afforded by the spines, these plants provide an additional and perhaps even more effectual protection in the milky juice or latex they secrete the properties of which are both acrid and vesicatory.

To show that similar modifications occur in monocotyledons, let us take the Liliaceae, as represented at Kew Gardens. *Dasylirion glaucum* has a rather slender trunk, clothed with the persistent leaves and leaf-bases. The individual leaves are sessile, almost linear, toothed, with an excessively thick cuticle on both surfaces. *D. hookeri* shows a huge, short, irregularly globular trunk, surmounted by a few glaucous, sedge-like leaves. In the genus *Aloe* the leaves are thick and succulent, with a central water-containing tissue. Some species are deciduous (*A. cooperi*). *Gasteria* has similar succulent leaves, with a tough, warty epidermis, the leaves being arranged in two or three orthantichies. In *Haworthia* we have short, succulent leaves forming rosettes, one section with a thin, another with a thick, cuticularised and warty epidermis. A similar state of things obtains in *Apicra*, where the stem elongates somewhat, and the leaves are further reduced. An interesting biological fact about these four genera is that they will all hybridize. In *Bulbine caulescens* the leaves are almost subulate and fleshy; in *Asparagus* the leaves are reduced to minute scales, flattened branches performing their function. Finally, *Bowcia volubilis* goes a step further, as it forms a bulb, but many years elapse between the successive formations of normal leaves, which, when formed, only last for a brief period. The permanent assimilatory organs are here the slender, much-branched inflorescences which develop annually, and are for the most part barren.

What is perhaps even more remarkable, we can trace all these grades of leaf-reduction in a single genus of the Compositae, viz., *Senecio*. The extremes of vegetative structure are probably greater in this genus than in any other single genus in the vegetable kingdom. *Senecio subscandens* is a scrambling, semi-herbaceous species with well-developed, pinnatisect leaves. *S. macroglossus* is a true climber, with thin, terete, twining stems, and slightly succulent, ivy-like leaves; *S. articulatus* has glaucous succulent articulated stems bearing thin and glaucous sinuate leaves; *S. pyramidatus* is a semi-succulent, much-branched species with almost acicular leaves; finally, in *S. junceus*, no leaves are developed, the stems being green, terete, and ribbed, looking very like *Equisetum hyemale*.

A retrospective glance at what has been said, points out very clearly the following interesting fact; that groups of plants widely separated by botanical affinity and geographical area have, under similar climatic conditions, followed parallel lines of adaptation. So closely, indeed, do some simulate others, that they become indistinguishable so far as external vegetative morphology is concerned. For instance, remark the close resemblance between *Cereus peruviana* and *Euphorbia abyssinica*, the former belonging to the Cactaceae, the latter to the Euphorbiaceae. Again, who but an expert could distinguish between *E. aphylla* and *Rhipsalis fusialis*, or indeed, between any of the following pairs of plants: *Euphorbia pendula* (Euphorbiaceae) and *Sarcostemma Australis* (Asclepiadeae); *Senecio junceus* (Compositae) and *Sarcostemma viminale* (Asclepiadeae); *Rhipsalis paradoxa* (Cactaceae), and *Vitis quadrangularis* (Ampelidaceae); or finally *Crassula lycapodiades* (Crassulaceae), and *Lycopodium clavatum*?

In many of these xerophytic plants, the basal portion of the stem becomes enlarged, ultimately forming a huge, more or less globular, structure in which water and reserve food may be stored for a very lengthy period. By aid of this, they can withstand the longest period of drought. These structures appear indiscriminately in groups of plants widely remote from each other by descent, as the following examples will prove: *Testudinaria elephantipes* (Dioscoreae), *Gerardanthus tomentosus* (Cucurbitaceae), *Fockia glabrata* (Asclepiadeae), *Stephania rotunda* (Menispermeae), *Beaucarnea recurvata* (Liliaceae), etc.

Another interesting fact concerning xerophytes generally, is their ready means of vegetative propagation. In almost all of them, any part of the vegetative structure will give origin to young plants under suitable conditions. The jointed

stems of *Opuntia, Senecio, Epiphyllum,* etc., readily separate into segments, each of which will develop into a new plant. In many columnar species of *Cactus* and *Euphorbia,* while there is no special provisions for propagation by segmentation, yet, if any portion of the stem be accidentally broken off, this will develop into a new individual. The leaves of all the species of *Cotyledon,* and of *Bryophyllum calycinum,* and many other Crassulaceae readily fall away if shaken, and from the base of every one of these detached leaves, or from the entire margin in the case of *Bryophyllum,* several buds quickly develop and soon form independent plants. The same obtains in *Gasteria* and *Haworthia. Oxalis* forms numerous underground tubers, after the manner of a miniature potato-plant. On the flower-spike of *Agave,* or century-plant (so called from the erroneous idea that it only bloomed once in a hundred years), bulbils are frequently developed which would thus ensure the perpetuation of the species, even if the seeds failed. Many species of *Agave* only flower once, and then die (monocarpie), whereas others flower periodically (polycarpie). A very interesting case was observed in a plant of *Agave kewensis,* a very fine species, and the only one known in cultivation. A few years ago this plant flowered and all attempts to fertilise the flowers failed, and the plant, which belongs to the monocarpie series, began to die. One day, to the great joy of all concerned, bulbils were discovered replacing the flowers at the apex of the spike. These were removed, and a fine stock of young plants raised from them.

Not only are the various regetative parts adapted for the perpetuation of the species, but the seeds also are specially adapted. In Cactaceae, for example, the seeds are shot-like, and embedded in a pulpy fruit. In many genera, especially *Opuntia,* these fruits are eaten by animals, including man. They have much the taste of a gooseberry. The seeds are not digested, but pass out in the excreta. So great a pest have opuntias become in South Africa that a law has been passed forbidding the natives eating the prickly pears as the fruit is called. In *Melocactus* and *Mamillaria,* the ovary is protected by tufts of dense hair and spines until the seeds are matured, when it is forced out on to the surface. Its brilliant colour attracts birds, and thus the seeds are disseminated. In the epiphytic genus *Rhipsalis,* the fruit is red or white, and looks very like the fruit of *Loranthus. Rhipsalis cassytha,* the mistletoe-cactus, resembles our mistletoe very closely, even to the white berries. Here, too, the pulp of the berries is adhesive and encloses a few large seeds, which birds separate by rubbing against the bark of the trees, where the seeds lodge in the crevices and germinate. Another interesting fact about this mistletoe-cactus is that it is the only cactaceous plant truly indigenous in the Old World, occurring on the West Coast of Africa and in Madagascar. The seeds of all xerophytes agree in their rapidity of germination and development in the initial stages. I may generalize, and say that if seeds of xerophytes fail to germinate in about three weeks, they have lost their vitality. I have sown seeds of what used to be called the rose of Jericho (*Anastatica hierochuntica*), and within twenty-four hours they have germinated with their epigean cotyledons fully expanded. This plant will stand being blown about the Arabian deserts for months, rolling itself up into a ball. When rain falls, it unfolds itself, its capsules dehisce, and the seeds germinate immediately. Many similar instances could be given, but it is beyond the province of this article.

At first sight this rapid germination may seem inexplicable when contrasted with the slow development of the adult. A moment's consideration, however, will show the completeness of the adaptation. In the arid habitat of these plants, it is obviously their duty to make the best use of rain when it does fall—hence the advantage of the seeds' germinating quickly, and the young plants getting a firm hold before the rainy season has passed.

Thus far I have attempted, in a somewhat desultory manner, to point out a few facts concerning the denizens of the Succulent House at Kew Gardens, interesting, I hope, to all lovers of plants, especially those readers with a botanical turn of mind. I will now append a few remarks of a more special character, relating to the commercial side of plant life. I will endeavour to show that from a purely utilitarian standpoint this house is of special interest. It contains a rare collection of plants which yield valuable commercial fibres, to say nothing of other plants which, if tried, might add considerably to the number of standard fibre-producing species. The fibre-yielding plants contained in this house are all monocotyledons. The fibres are extracted from the leaves and may be termed leaf fibres, to distinguish them from the bast fibres, such as flax, hemp, jute, etc., or seed-hairs, such as cotton. For description of the fibres, modes of cleaning, uses, and market-price, reference must be made to the literature on this subject. All I can do in the limited space at command is to enumerate the principal plants which yield fibres, attaching to each their commercial names, hoping in this way to draw attention to their presence in this house. The more important of these are: Sisal hemp (*Agave rigida* var. *sisalana*); Bombay or Manila aloe fibre (*A. vivipara*); Istle, or Mexican fibre *A. heteracantha*); Jamaica Keratto (*A. morrisii*); Mauritius hemp (*Furcraea gigantea*); silk-grass fibre (*F. cubensis,* and *F. selloa*); Caraguata fibre (*Bromelia argentina*); Ife hemp (*Sansevieria cylin-*

drica); Konje hemp (*S. guineensis*); and Neyanda (*S. zeylanica*). Other plants yielding fibres of varying quality are: *Agave americana*, *A. sobilifera*, *A. lurida*, *Karatas plumieri*, and *Bromelia sylvestris*. Other plants of special commercial interest are: *Aloe vulgaris*, *A. ferox*, and *A. plicatilis*, the inspissated juice of which forms the "aloes" of commerce, and *E. resinifera*, which yields the well-nown gum-euphorbium.

A circumspective glance at the whole subject forces us to the conclusion that, whether we view it from a popular, scientific, or commercial standpoint, this house is certainly one of the most interesting and important in the Royal Gardens, Kew. Its parallel is not to be found in Europe or America any more than that of the Gardens themselves. My object has been mainly to emphasize the richness of this marvellous collection of xerophytes in botanical facts, especially those relating to "plant metamorphosis," or adaptation to environment. The subject is too vast to treat in any but a very general way, and innumerable interesting points have been crowded out. I trust enough has been said to illustrate the two following cardinal points: (1) The relative stability of the floral over the vegetative organs; thus pointing to their pre-eminence as a basis for classification; (2) To quote Goëbel in "Science Progress," Vol. III.: "That physiological requirement is the main factor, teleologically speaking, in effecting structural differentiation, and the particular organ which will undergo the modification will be that which is most susceptible to a change in the desirable direction."

55, Waldemar Avenue, Fulham, S.W.
11 March, 1899.

London Geological Field Class, conducted by Professor H. G. Seeley, F.R.S., commenced their annual series of Saturday afternoon excursions on April 22nd. Full particulars can be obtained from the hon. sec., R. Herbert Bentley, 43, Gloucester Road, Brownswood Park, N.

The Natural History Sub-committee of the British Association meeting in Glasgow 1901 is in working order, and has issued its circular inviting contributions to lists of the Fauna, Flora and Geological features of the Clyde district. We note the names of many well-known naturalists who have undertaken to supervise the departments in which they are celebrated workers. The honorary Secretary is the Rev. G. A. Frank Knight, Almanarre, Garelochhead.

The Managers of the Cambridge University Press send their March list of books recently issued. There are several important works in the scientific section of this list, including "Fauna Hawaiiensis," being results of explorations instituted by a joint committee of the Royal Society and British Association. The work is edited by Mr. David Sharp, M.A., F.R.S. The first part contains 122 pp., and 2 plates relating to the bees, wasps, and ants, with many new species.

NOTES ON MOLLUSCA.

By Rev. R. Ashington Bullen, F.G.S.

At Reigate, Surrey.

Mr. Lionel E. Adams (Brit. L. and F. W. Shells, 2nd edition, p. 75) says of *Helix cantiana*, "I have never observed that birds feed upon it." Last summer freshly broken shells of *Helicella cantiana* occurred abundantly during the driest part of the season in the footpath near a large flint stone, evidently a "thrush-stone," close to the old butts under Colley Hill.

Helix pomatia was plentiful on dock on June 2nd, 1898. The weather being then rather wet, *pomatia* was also burrowing into the moist ground. On June 29 we found *H. pomatia* depositing eggs in its burrow, at the Horseshoe, Colley Hill, the weather being fine and dry. One egg dropped from it as my daughter, Evelyn, lifted it from its burrow. I took sixteen eggs in all, but they shrivelled up. I could not find the burrow on the next visit, and cannot say whether any more were deposited. I had found *Helix hortensis* ovipositing at Gomshall on the 11th of June. In this case also the number was sixteen. I was unable to hatch these; though I kept them moistened on damp dead leaves, they cracked. *Helix cantiana* at Reigate preferred nettle and dock, whilst at Dover in April and May it haunted the bramble leaves.

At Little Stukeley, Hunts.

Principally in the fine weather of November last, but occasionally since, I have found the following land shells at Little Stukeley:—*Helix aspersa* and *H. hontensis* were both abundant, *H. nemoralis* fairly common. My daughter Eirene found three specimens of *Helicella cantiana* in Cow Lane, an old grass cattle road running into the Ermine Street. To her specimens I have been able to add a dozen from the same spot. *Helicella itala* and *H. virgata* are the commonest molluscs, occurring in myriads on the broad grass borders of the Ermine Street, towards Alcarbury Hill and elsewhere. The high road is metalled with Mount Sorrel granite .Last November I counted, in a distance of about two miles, seventy-one *H. virgata* and about half that number of *H. itala* resting on the roadway. As they were mostly making new shell at the time they perhaps got the necessary lime in this way. *H. caperata* is less common than the above two *Helicella*. *Helicigona lapicida* also occurs in Cow Lane. *Vitrea nitidula*, *Bulimus obscurus*, *Cochlicopa lubrica*, *Vallonia pulchella*, *Pupa muscorum*, *Clausilia bidentata*, *Acanthinula aculeata*, *Hygromia rufescens*, *Hy. hispida*, *Carychium minimum*, and *Arion ater* all occur in this district. I hope to extend the list during this summer. Of the above, *V. nitidula*, *A. aculeata*, *H. lapicida*, *H. nemoralis*, *H. cantiana*, *Hy. rufescens*, *H. caperata*, *B. obscurus*, *P. muscorum*, *C. lubrica*, *C. minimum*, *A. bidentata*, are new records for the county of Huntingdon. The freshwater fauna seems to have been better examined than that of the land.

Little Stukeley Rectory, April, 1899.

LEPIDOPTERA IN SOUTH-EAST ESSEX.

By F. G. Whittle.

(*Concluded from page 327.*)

Pyralides.

I HAVE taken thirty species of these elegant moths in my district; they are as follows:—

Cledeobia angustalis. Shoeburyness and Benfleet; not common.

Aglossa cuprealis. Once only, at rest on a barn at Bowers Gifford.

Pyralis costalis. Southend; at light and sugar. *P. glaucinalis,* Southend and Benfleet; at sugar. *P. farinalis,* Southend.

Scoparia ambigualis. Leigh, Southchurch, Hockley, Eastwood; common on tree trunks. *S. cembrae,* Benfleet, Southend, Prittlewell; not uncommon at light. *S. dubitalis,* abundant. *S. mercurella,* Eastwood and Southend; common. *S. truncicolella,* Eastwood; once only. *S. pallida,* abundant in a reed-bed near Benfleet; once only at Eastwood.

Nomophila noctuella. This capricious insect was abundant at ragwort, light and sugar in 1893; was seen in 1894, but not since.

Pyrausta purpuralis. Eastwood; not common.

Herbula cespitalis. Shoeburyness, Leigh, Benfleet, Canvey; common.

Ennychia octomaculata. Eastwood; not common.

Endotricha flammealis. Eastwood and Southend; common at light.

Eurrhypara urticata. Very common among nettles and on fences.

Scopula lutealis. Once only, at Pitsea. *S. olivalis,* Eastwood and Southend; common. *S. prunalis*; generally common. *S. ferrugalis,* Southend, at light and sugar.

Botys ruralis. Abundant among nettles. *B. fuscalis,* common at Eastwood.

Ebulea crocealis. Benfleet, Eastwood, Leigh; not uncommon.

Spilodes verticalis. Shoeburyness and Eastwood; not common.

Pionea forficalis. Abundant.

Perinephele lancealis. Eastwood; scarce.

Cataclysta lemnata, common.

Paraponyx stratiotata. Shoeburyness; not common.

Hydrocampa nymphaeata. Southend, Eastwood, Benfleet; not common.

Pterophori.

I have found eleven species of plume-moths in South-East Essex. The most characteristic is the sea-lavender feeding species, *Agdistis bennetii,* which occurs on the saltings throughout the district.

Chrysocoris festaliella. Once only, on bramble bloom at Eastwood.

Agdistis bennetii. This very interesting exclusively British insect is common on all our salt marshes; larvae on *Statice limonium.*

Platyptilia bertrami. Generally distributed along the river walls; but not common.

P. gonodactyla. Flying over coltsfoot at Southend.

Mimaeseoptilus phaeodactylus. Among *Ononis* at Benfleet; not common. *M. bipunctidactyla,* Eastwood; common. *M. pterodactylus,* Shoeburyness, Leigh and Eastwood; common.

Pterophorus monodactylus. Abundant.

Leioptilus tephradactylus. Eastwood; once only.

Aciptilia pentadactyla. Very common.

Alucita hexadactyla. Eastwood and Southend; not common.

Crambi.

Of Crambi we have at least twenty-one species, they are:—

Chilo phragmitellus. Vange, Benfleet; abundant and variable.

Platytes cerussellus. Common, but one may collect for several seasons and find males only. Only once in nine years have I witnessed the flight of females. They then outnumbered the males.

Crambus pratellus. Abundant. *C. pascuellus,* Shoeburyness, Leigh and Eastwood; common. *C. perlellus,* common near the river wall. *C. selasellus.* Rather common on all salt marshes. *C. tristellus,* abundant. *C. inquinatellus,* Eastwood; very common. *C. salinellus,* Benfleet, not common. *C. geniculeus, C. culmellus,* and *C. hortuellus,* all very common.

Myelophila cribrum. Generally common on thistles.

Homoeosoma sinuella. All over the district; rather common. *H. binaevella,* Shoeburyness, Benfleet, and Canvey; not common. *H. cretacella,* larvae on ragwort at Leigh; scarce. This moth was added to the British list by Mr. Howard Vaughan, who discovered it at Leigh in May, 1869.

Ephestia elutella. Southend and Benfleet.

Rhodophaea consociella. Eastwood; rather common. *R. advenella,* Benfleet; scarce at light. *R. tumidella,* Eastwood; common.

Galleria mellonella. Shoeburyness and Leigh; not common.

Tortrices.

I have taken 130 species of Tortrices in South-East Essex. They are:—

Tortrix podana. Southend and Benfleet; bred from ash and sallow. *T. xylosteana,* Southend. *T. sorbiana,* Eastwood and Southend; not common. *T. rosana,* Benfleet and Eastwood common. *T. heparana,* very common. *T. ribeana,* Southend and Eastwood; common. *T. unifasciana,* very common. *T. costana,* common. The unicolorous variety (of this species or the next) *latiorana,* which was first captured by Mr. S. Stevens in a salt-marsh near Southend and described in the "Entomologist's Annual" for 1857 (*see*

Wilkinson's "Tortrices," page 57) occurs; but is not common. I have bred one from a larva found in a folded leaf of *Statice limonium*, *T. viburnana*. Larvae not uncommon in twisted tops of sea wormwood. Two or three specimens of the red form (Curtis' "British Entomology," plate 763, 2nd fig. of *T. galiana*) bred. One netted at Eastwood. *T. viridana*, abundant. A few specimens netted on the open marsh where one would hardly expect to get this species. *T. ministrana*, Eastwood; rather common. *T. forsterana*, Southend and Eastwood; not common.

Dichelia grotiana. Eastwood; not common.

Peronea rufana. Leigh; scarce. *P. variegana*, Southend, Leigh and Benfleet; common and variable in Southend gardens. *P. ferrugana*. Eastwood; not common.

Rhacodia caudana. Eastwood; not common. This moth is curiously like one of the fragments of dead foliage which fall so freely under the beating-stick in the autumn.

Teras contaminana. Very common and variable.

Dictyopteryx loeflingiana. Eastwood; not uncommon. *D. holmiana*. Southend; not common. *D. bergmanniana* and *D. forskaleana*, very common.

Argyrotoza conwayana. Eastwood and Leigh; common.

Ptycholoma lecheana. Eastwood; bred from sallow.

Ditula hartmanniana. Common among *Salix* at Benfleet.

Penthina corticana. Eastwood; scarce. *P. betulaetana*. Eastwood; not common. *P. pruniana*, very common. *P. variegana*. Southend, Leigh and Benfleet. *P. gentiana*. Larvae very common in heads of *Dipsacus* at Eastwood.

Antithesia salicella. Common on fences under bushes of *Salix*. Looks remarkably like the excrement of a bird.

Hedya ocellana, *H. aceriana*, and *H. dealbana* are all common.

Spilonota trimaculana. Benfleet and Southend; not uncommon. *S. roborana*. Shoeburyness; not common.

Pardia tripunctana. Southend and Eastwood; common.

Aspis udmanniana. Larvae common.

Sideria achatana. Southend and Benfleet; not uncommon.

Sericoris littoralis. Shoeburyness; common. *S. urticana*, Hockley and Eastwood. *S. lacunana*, very common.

Roxana arcuana. Hockley and Eastwood; rather common.

Orthotaenia striana. Southend; not common. *O. branderiana*, larvae not uncommon in rolled aspen leaves at Eastwood. *O. ericetana*, Benfleet; not common.

Phtheochroa rugosana. A few on fences at Southend.

Cnephasia politana. Benfleet; once only. *C. musculana*, Eastwood and Shoeburyness.

Sciaphila nubilana. Southend and Benfleet. *S. conspersana*, bred from sea-wormwood, yarrow, ragwort, and ox-eye daisy. *S. subjectana* and *S. virgaureana*, generally common. *S. chrysantheana*, Eastwood; not common. *S hybridana*, abundant on the river walls.

Sphaleroptera ictericana. Rather common; bred from ox-eye daisy.

Capua favillaceana. Eastwood; very common in Carpenter's Wood, where there is much hornbeam.

Bactra lanceolana. Common in ditches among *Scirpus maritimus*. Large examples of the testaceous brown form taken by Mr. S. Stevens and referred to in Wilkinson's "Tortrices," pages 146-7, still occur.

Phoxopteryx siculana. Eastwood; one only from a pupa found on buckthorn. *P. lundana*, Leigh and Eastwood; not common. *P. diminutana* and *P. mitterpacheriana*. Eastwood; not common. *P. lactana*. Eastwood; scarce.

Grapholitha ramella. Eastwood; scarce. *G. nisella*, Eastwood, bred from sallow catkins. *G. nigromaculana*, not uncommon among ragwort. *G. subocellana*, Eastwood; common. *G. trimaculana*, abundant. *G. penkleriana* and *G. obtusana*, Eastwood; not common. *G. naevana*, Southend; scarce. *G. geminana*, Eastwood; not common.

Phloeodes tetraquetrana. Eastwood; common. *P. immundana*, Eastwood; scarce.

Batodes angustiorana. Southend and Eastwood.

Paedisca b lunana. Eastwood; not common. *P. corticana*, abundant. *P. profundana*. Eastwood; not common. *P. solandriana*, Eastwood. *P. sordidana*. Eastwood; one bred from sallow.

Ephippiphora brunnichiana. Southend and Eastwood; rather common. *E. trigeminana*, Shoeburyness, Leigh, Benfleet and Pitsea. *E. tetragonana*, Eastwood.

Semasia ianthinana. Southend. *S. rufillana*, larvae common in the heads of *Daucus carota*. *S. woeberiana*. Southend.

Coccyx splendidulana and *C. argyrana*. Eastwood; not common.

Carpocapsa splendidana. Eastwood; not common.

Endopisa nigricana. Benfleet, Leigh and Eastwood.

Stigmonota compositella. Southend and Canvey, once on a salt-marsh. *S. nitidana*. Eastwood; common. *S. regiana*. Southend; common. *S. roseticolana*. Eastwood; not common.

Dicrorampha politana. Leigh and Southchurch. *D. sequana*, Benfleet and Hockley, rather common. *D. petiverana*, Southend; not common. *D. plumbana* and *D. plumbagana*, common. *D. acuminatana*, Eastwood; scarce.

Catoptria albersana. Larvae at Eastwood. *C. ulicetana*, Shoeburyness and Eastwood; abundant. *C. hypericana*, Benfleet and Eastwood; not

common. *C. cana,* common among thistles. *C. candidulana,* among sea-wormwood; common. *C. scopoliana,* Benfleet and Eastwood; common among *Centaurea nigra.* *C. aemulana,* Eastwood; two specimens flying over heather, but a few plants of *Solidago* were near. *C. tripoliana,* abundant and variable; larvae in heads of *Aster tripoleum* at Benfleet. *C. expallidana,* Benfleet; one only. *C. citrana,* Canvey; not common. This moth was added to the British list by Mr. S. Stevens, who took the first specimens near Southend some fifty years ago.

Symaethis oxyacanthella. Abundant.

Eupoecilia dubitana. Eastwood. *E. atricapitana,* Benfleet; on ragwort. *E. angustana,* Benfleet and Eastwood. *E. affinitana,* Benfleet, Canvey, Pitsea; salt marshes. *E. vectisana,* Benfleet and Shoeburyness. *E. roseana,* larvae common in heade of *Dipsacus.*

Xanthosetia zoegana. Southend; scarce. *X. hamana,* very common.

Chrosis alcella. Leigh and Benfleet.

Lobesia reliquana. Eastwood; common.

Argyrolepia zephyrana. Vange, Benfleet, Shoeburyness; rather common. [It used to occur on the cliffs opposite end of Marine Avenue, Southend, or by fences up to Leigh.—J. T. C.] *A. badiana,* Shoeburyness; scarce. *A. cnicana,* Eastwood; scarce. *A. aeneana,* Benfleet; scarce.

Conchylis francillana. Benfleet, Leigh, and Shoeburyness. *C. dilucidana.* Leigh. *C. smeathmaniana,* Southend; scarce. *C. straminea,* Benfleet, Leigh, and Shoeburyness; one bred from *Centaurea nigra*; not uncommon.

Tortricodes hyemana. Eastwood; common.

TINEAE.

I have given very little attention to this important division of the Micro-lepidoptera, hence such a meagre list of 152 species, which could be extended much beyond its present length in the course of a single season. It will be found, however, that one or two species of more than ordinary interest are included.

Lemnatophila phryganella, Eastwood; not uncommon.

Diurnea fagella. Eastwood; common.

Semioscopus avellanella. Eastwood; rare.

Talaeporia pseudo-bombycella. Eastwood and Hockley; cases not uncommon on tree trunks.

Epichnopterx pulla. Cases are often found on the river wall and at the edges of salt-marshes. *E. reticella.* This beautiful and rare insect is attached to the cord-grass (*Spartina stricta*), on which plant, but always low down, and on the soil near and under it, I have found cases containing larvae. The legless and wingless female is also without antennae. She never leaves the case in which she has lived as a larva; is parthenogenitic, and yet able to strongly influence the other sex. I have occasionally used her as a decoy for assembling the males. I once observed a moth settle on a dead flower disk or receptacle of sea starwort (*Aster tripoleum*), a beautiful example of colour assimilation. Extremely local, this species is known only from the salt marshes of the estuary of the Thames, the coast of Sussex, Hampshire, and Breda in Holland. This moth is apparently quite unrepresented in some of the best collections on the continent of Europe. An ichneumon bred from this species is thought by Mr. Bignell to be a small *Lissonota commixta.* Mr. Barrett's monograph of the genus *Psyche* and its allies, published in the "Entomologist's Monthly Magazine," vol. 30, should be consulted by everyone interested in this group.

Fumea roboricolella. Cases common on fences, tree-trunks, and foliage of oak (common), birch, etc.; as well as on grasses skirting the river walls and salt marshes.

Ochsenheimeria birdella. Larvae occasionally found on cock's-foot grass at Benfleet.

Scardia parasitella. Eastwood; scarce. *S. cloacella,* Southend and Eastwood.

Blabophanes ferruginella. Southend. *B. rusticella.* Southend and Leigh; common.

Tinea pellionella. Southend; common. *T. fuscipunctella,* Southend.

Tineola biselliella. Much too common.

Lampronia quadripunctella. Eastwood; scarce. *L. luzella* and *L. praelatella,* Hockley; scarce.

Incurvaria muscalella. Eastwood and Shoeburyness; common.

Micropteryx calthella. Hockley. *M. sparmannella,* Eastwood; scarce. *M. subpurpurella,* Eastwood; very common.

Nemophora swammerdammella. Eastwood; not common. *N. schwarziella,* Eastwood; common.

Adela degeerella. Benfleet, Eastwood, Hockley; common. *A. viridella,* Eastwood; abundant.

Nematois cupriacellus. Eastwood; one only, on ragwort.

Swammerdammia combinella. Southend and Hockley; not common. *S. oxyacanthella,* Southend and Benfleet; common. *S. pyrella,* Benfleet, Leigh, and Southend.

Scythropia crataegella. Leigh and Benfleet; not common.

Hyponomeuta plumbellus. Prittlewell; when at rest resembles the excrement of a bird. *H. padellus,* far too common. *H. cagnagellus,* common; larvae on spindle.

Prays curtisellus. Prittlewell; common.

Plutella cruciferarum. Abundant. *P. porrectella,* Southend; not common,

Cerostoma vittella. Southend; sugared elm trunks. *C. radiatella,* Southend and Eastwood; abundant and very variable. *C. costella,* Eastwood; not common. *C. alpella,* Eastwood; once only.

Harpipteryx nemorella. Prittlewell; once only. *H. xylostella,* Eastwood; common.

Phibalocera quercana. Southend and Eastwood; very common.

Depressaria costosa. Eastwood; bred from broom. *D. flavella*, Eastwood. *D. assimilella*, Eastwood and Prittlewell; larva in axils of drawn-together twigs of broom. *D. arenella*, by far the commonest of the genus. *D. propinquella*, Southend and Benfleet. *D. subpropinquella*, Southend. *D. alstroemeriana*, Southend and Pitsea; not common. *D. purpurea*, Southend; not common. *D. yeatiana* and *D. applana*, Benfleet. *D. badiella*, Southend; one only. *D. heracleana*, Southend, Prittlewell, Eastwood; larvae very common.

Gelechia mulinella. Eastwood; larvae common in flowers of broom. *G. scalella*, Eastwood; rather common on tree trunks.

Bryotropha terrella. Abundant.

Lita maculella. Eastwood; not common. *L. tricolorella*, Leigh; not common. *L. ocellatella*, Benfleet and Shoeburyness. *L. suaedella*, Canvey. *L. instabilella*, Benfleet and Pitsea, common. *L. atriplicella*, abundant.

Teleia proximella. Eastwood. *T. notatella*, Hockley. *T. vulgella*, Leigh and Benfleet. *T. scriptella*, Eastwood; not common.

Recurvaria nanella. Southend; not common.

Poecilia nivea. Eastwood. *P. albiceps*, Southend.

Argyritis pictella. Leigh; scarce. Mr. S. Stevens, when at Southend some fifty years ago, added this species to the British list.

Apodia bifractella. On *Inula* at Leigh; common.

Ptocheuusa inopella. Leigh and Southend; bred from *Inula* bloom.

Ergatis brizella. Among thrift, at Shoeburyness and Canvey.

Ceratophora rufescens. Benfleet and Southend. *C. inornatella*, among reeds at Benfleet.

Parasia lappella. Among *Centaurea nigra* at Benfleet.

Harpella geoffrella. Southend, Benfleet, Eastwood, Hockley; common.

Dasycera sulphurella. Fences; common. *D. olivierella*, Eastwood; not common.

Oecophora panzerella. Eastwood and Hockley; common. *O. unitella*, Prittlewell; once only. *O. fuscescens*, Southend; once only. *O. pseudospretella*, much too common.

Oecogenia quadripunctata. Southend; not common

Endrosis fenestrella. Much too common.

Glyphipteryx fuscoviridella. Eastwood and Hockley abundant. *G. equitella*, Leigh and Eastwood.

Heliozele sericiella. Eastwood.

Argyresthia nitidella. very common. *A. spiniella*, Eastwood and Southend. *A. albistria* and *A. mendica*, Southend, Benfleet and Eastwood. *A. retinella*, Eastwood; uncommon. *A. pygmaeella*, Eastwood; bred from sallow. *A. goedartella*, Eastwood. *B. brochella*, Eastwood.

Gracilaria alchimiella. Eastwood; common. *G. stigmatella*, Benfleet; uncommon. *G. tringipennella*, Benfleet; scarce. *G. syringella*, Southend; abundant.

Ornix angelicella. Abundant. *O. torquillella*, Southend and Eastwood.

Coleophora conspicuella. Among knapweed at Benfleet; not common. *C. albicosta*, Southend. *C. anatipennella*, Benfleet. *C. palliatellu*, cases at Eastwood. *C. ibipennella*, Eastwood. *C. maritimella*, cases on *Artemisia maritima* at Vange. *C. artemisicolella*, cases at Vange, Canvey, and Leigh. *C. caespititiella*, cases plentiful on rushes. *C. laripennella* and *C. salinella*, Benfleet and Great Wakering. *C. argentula*, cases common on yarrow. *C. tripoliella*, bred from sea-aster. *C. albitarsella*, Southend; cases common on ground ivy and fences near. *C. fuscedinella*, very common at Eastwood. *C. gryphipennella*, Benfleet; scarce. *C. viminetella*, cases on osier at Eastwood. *C. lutipennella*, Eastwood; abundant.

Laverna epilobiella. Southend; common. *L. ochraceella*, Eastwood; scarce.

Chrysoclysta aurifrontella. Eastwood; scarce.

Asychna modestella. Eastwood; in flowers of *Stellaria holostea*.

Elachista obscurella and *E. triatomea*. Benfleet, scarce. *E. rufocinerea* and *E. argentella*, abundant. Pupæ of the latter occasionally found among Spartina.

Tischeria complanella and *T. dodonaea*. Eastwood; not common. *T. marginea*, Prittlewell and Southend; bred from bramble.

Lithocolletis lantanella. Southend and Eastwood. *L. coryli*, Eastwood. *L. faginella*, Southend; bred from beech. *L. carpinicolella*, Eastwood. *L. ulmifoliella*, Eastwood; bred from birch. *L. quercifoliella*, abundant. *L. corylifoliella*, Benfleet and Southend. *L. cramerella*, Eastwood; abundant. *L. tenella*, Eastwood; not common. *L. sylvella*, Eastwood and Southend; not common. *L. emberizaepennella*, Eastwood; scarce. *L. schreberella*, Eastwood. *L. tristrigella*, Southend; common.

Cemiostoma spartifoliella, Eastwood; abundant. *C. laburnella*, Southend.

Bucculatrix maritima. Salt marshes; abundant. *B. cristatella*, Benfleet.

Nepticula subbimaculella. Eastwood. *N. marginicolella*, Southend.

In concluding this list of 663 species, 100 of which, by-the-bye, I took for the first time, in consequence of working inland localities, during the season of 1898, I should like to draw attention to the extraordinary addition to the British fauna made at Southend in a single day by Mr. Samuel Stevens. The list is published in the "Entomologists' Monthly Magazine," vol. 8, page 138, and comprises the following species, viz.:—*Acidalia perochraria*, *Catoptria citrana*, *Gelechia pictella*, *Butalis cicadella*.

3, Marine Avenue, Southend-on-Sea,
25th March, 1899.

BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

A Junior Course of Practical Zoology. By the late A. MILNES MARSHALL, M.D., D.Sc., M.A., F.R.S., and the late C. HERBERT HURST, Ph.D. Fifth Edition, revised by F. W. GAMBLE, M.Sc. xviii. + 486 pp. $7\frac{3}{4}$ in. × $5\frac{1}{4}$ in., with upwards of 70 illustrations. (London: Smith, Elder & Co., 1899.) 10s. 6d.

In consequence of the lamented deaths of the authors, Mr. Gamble was invited to revise and bring up to date this well-known text-book of zoology, though it has not been found necessary to alter, in any way, the general plan of the work. That it has reached the fifth edition is a sufficient indication of the usefulness of this book.

Text-Book of Zoology. By H. G. WELLS, B.Sc., F.G.S. Enlarged and revised by A. M. DAVIES, B.Sc. viii. + 366 pp. 7 in. × 5 in. and 184 illustrations. (London: W. B. Clive, 1899.) 6s. 6d.

This text-book is in use among the students of the University Correspondence College, London, and contains apparently exactly the necessary amount of information to enable the student to pass his examination in zoology at the University of London. Brevity and conciseness are the chief features of the book, and the facts are fully illustrated by the figures in the text. The form of teaching is founded on the type-system, a rather risky method of imparting knowledge unless the student is guarded from running into too restricted methods. This danger appears to be kept well before the reader, and any intelligent person may keep out of error with the exercise of common sense.

A Text-Book of Botany. By J. M. LOWSON, M.A., B.Sc., F.L.S. viii. + 394 pp. 7 in. × 5 in., with 246 illustrations. (London: W. B. Clive, 1899.) 6s. 6d.

This book, like that on Zoology last noticed, is one of the 'University Tutorial Series' of the University Correspondence College. It is arranged in a similar manner, and forms a concise introduction to structural botany, including the fungi and lower forms of plants.

Handbook of Physiology. By W. D. HALLIBURTON. M.D., F.R.S. 15th Edition. xix. + 872 pp. 9 in. × $5\frac{1}{2}$ in. with upwards of 650 illustrations. (London: John Murray, 1899). 14s.

The fifteenth edition of "Kirke's Handbook of Physiology" brings up this standard work to the most recent knowledge of the human organs and their functions. The rapid strides in the study of animal physiology so frequently make additions to the knowledge of the subject, that every new edition of this work bears the stamp of novelty. In this last one Dr. Halliburton has incorporated the most recent discoveries. The book is produced in its usual admirable style, with abundance of plain and coloured illustrations.

The Story of Geographical Discovery. By JOSEPH JACOBS. 224 pp. with 25 illustrations, 6 in. × 4 in. (London, George Newnes Limited, 1899.) 1s.

This is a condensed, but interesting account of the manner in which different parts of the world became known to the inhabitants of Europe, commencing with the explorations of the Romans and continued to the most recent expedition of Nansen to the North Pole. As the writer points out in his introduction, the history of geographical discovery really means "the gradual bringing to the knowledge of the nations of civilization surrounding the Mediterranean Sea, the vast tract of land extending in all directions from it;" as the lands "discovered," were of course well known to their own inhabitants.

Intermediate Text Book of Geology. By CHARLES LAPWORTH, F.R.S. xvii. + 414 pp., $7\frac{1}{2}$ in. × 5 in. Illustrated by 174 figs. (Edinburgh and London: William Blackwood and Sons, 1899.) 5s.

Professor Lapworth has founded this useful book upon the late David Page's Introductory Text Book of Geology, which previously appeared in no less than twelve editions, the last being dated February in 1888. The ten years that have elapsed have rendered it necessary for Professor Lapworth to recast and rewrite most of the chapters. The work will be found more useful to the beginner than the advanced student, hence the word "Intermediate" in the title. Among the novelties, the present author has written a new series of recapitulations with the object of making each a complete synopsis of their respective chapters. Another feature is the attention paid to the geographical distribution of geological formations not only in Britain, but abroad generally. The work has been enlarged by about one hundred pages, and many of the figures have been replaced by fresh illustrations. This work is one eminently suited to persons desiring a sound though superficial knowledge of geology.

The Principles of Stratigraphical Geology. By J. E. MARR, M.A., F.R.S. 309 pp., $7\frac{1}{2}$ in. × 5 in., illustrated by 25 figs. (Cambridge: University Press, 1898.) 6s.

The author, who is a Fellow and Lecturer of St. John's College, Cambridge, and University Lecturer in Geology, aims at giving a general idea of the methods and scope of stratigraphical geology. This he does by avoiding a number of details and giving brief accounts of the strata of the different systems. As a work for the library of the general reader, this book will be useful and found to be one which will give ample information without overloading the reader with the trouble of mastering a number of items which can be easily acquired if the subject is found sufficiently attractive to continue its study.

Practical Work in Physics. Part IV. Magnetism and Electricity. By W. G. WOOLLCOMBE, M.A., B.Sc. xi. + 112 pp., $7\frac{1}{2}$ in. × 5 in., illustrated by twenty-two figures. (Oxford: Clarendon Press, 1899.) 2s.

The author, who is the senior science master in King Edward's High School, Birmingham, completes with this part his four sections of practical physics for schools and colleges. Most of the apparatus explained is of a simple character, and much may be home-made. The object of these handbooks seems to be to give sufficient elementary instruction to create a taste for future study.

SCIENCE GOSSIP

MESSRS. R. AND J. BECK, of 68, Cornhill, London, have sent an artistic pamphlet, upon the use of the "Frena" Camera. We understand Messrs. Beck will forward a copy to anyone upon application.

ON the evening of February 28th, Mr. Frank Sich, jun., and a companion noticed the zodiacal light as "a blunt cone of whitish light extending from the misty western horizon up towards, but not so far as, the Pleiades."

THE death is announced of Surgeon-Major George Charles Wallich, who died on March 31st, in his 84th year. He was a Fellow of the Royal Geographical Society, and wrote several important papers on biology and the distribution of the lower forms of animal and vegetable life.

THE NORTH KENT Natural History and Scientific Society lose by resignation their honorary Secretary in Mr. H. Webb. He is followed by Mr. Thomas W. Brown, a vice-President, who appeals for new members and other assistance for the Society. His address is 80B, Church Lane, Old Charlton.

A FLOCK of about thirty sandgrouse (*Syrrhaptes paradoxus* Pallas) have frequented a somewhat limited area on the Lincolnshire Wolds since the end of January. In the great invasion of sandgrouse in 1888, the first record for that county, was from the same spot, only in the month of May instead of the begining of the year.

THE Egyptian Government have decided to arrange a survey of the Nile, with the object of determining the species of fishes inhabiting its waters. The fishes obtained are to be sent to Mr. Boulenger, the ichthyologist on the staff of the British Museum.

THE Crystal Palace Company have arranged to institute some experiments in fish culture with the object of ultimately founding an English School of Pisciculture. The chief experiments will take place in the large aquarium, which has been cleaned previous to being stocked with several species of Salmonidae. The reservoir, lakes, and fountain basins in the grounds will also be utilised.

ONE of the most artistic monthly journals we have met with for some time is the *Photo-Miniature*, which is devoted to general photographic information. It consists of thirty-six pages of the unusual shape of 8 in. × 5 in. and is bound in an artistic cover. The frontispiece of No. 1 is a copy of Franz Hals' "Portrait of a Man," in the National Gallery, London. An article upon modern lenses illustrated by a number of diagrams occupies the whole of this first number, excepting a page of notes, and a plate of a November day by Georg Veder, from the Berlin National Gallery. It is published by Tennant and Ward, of New York, and Dawbarn and Ward Limited, of London, the price being 6d. net.

PHYSICS

CONDUCTED BY JAMES QUICK.

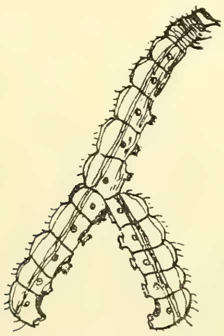
ATMOSPHERIC ELECTRICITY.—Experiments have been made recently by Pellatt to show to what extent evaporation of moisture from the earth's surface is responsible for atmospheric electricity. By putting a very flat dish into electrical communication with a quadrant electrometer, and observing the loss of charge in a given time, both when the dish was empty, and when full of water, Pellatt found that this loss was 40 to 60 per cent. of the original charge in one hour. There must, therefore, be this loss of charge and a gain of negative electrification by the air during the first warm hours of the day. The reverse process must set in after sunset. This consideration agrees with actual observations, but the observations of the 4 a.m. minimum and the 8 p.m. maximum have yet to be recorded.

ELECTRIC FISH OF THE NILE.—This subject formed the Friday evening lecture at the Royal Institution on March 17, by Professor Gotch. The *Malapterurus*, the fish discussed, is unlike the *Gymnotus* and the torpedo fish, in that its electric organ does not impede its motion. Professor Gotch believes that the seat of its electromotive force is in the nerve centre itself, and not the collection of "plates" hitherto considered to be the electric organ. These "plates" might be looked upon as forming a condenser or a series of condensers, charged at will by the fish. If so, they will account for some of the discharge phenomena.

WEHNELT'S CURRENT INTERRUPTOR.—A discovery of great interest to electricians has just been made by Dr. A. Wehnelt of Charlottenburg, and has taken a practical form in an electrolytic contact breaker for rapidly intermittent currents. Anyone who has worked with an induction coil will have experienced the worry that the ordinary form of contact breaker entails. Most of the spring breakers continually "jam" and short-circuit, while mercury breaks require much attention, and are poisonous. Dr. Wehnelt's break consists essentially of a cathode of sheet lead (any other metal will serve) and a platinum wire in close proximity to it as an anode. The two electrodes are then arranged in a cell with dilute sulphuric acid. When a suitable current is sent through, a rapidly intermittent discharge takes place between the two electrodes, the frequency of break being sometimes as great as 1,700 per second. So complete is the break of current, moreover, that no condenser is requisite to the induction coil. For the satisfactory working of this break it is best to use a high voltage, such as is obtainable from electric light mains. The efficiency of induction coils for Röntgen ray work is considerably increased by the use of this arrangement. Experiments made with this break show that if the platinum anode is sealed into a glass tube, the later is apt to break. This is probably due to the intense heat just at the discharge point. The use of an ebonite tube overcomes the difficulty.

NOTES & QUERIES

Malformed Caterpillar.—The accompanying drawing presents a magnified view of a curious Lepidopterous larva belonging to the family Oecophoridae, group Tineina, and is the only instance of the kind known to me. It is about half-an-inch in length, the seventh segment, as shown in the illustration, bearing an "attachment." The ground colour is fawn drab, with two subdorsal longitudinal bands of darker ground colour, proceeding the whole length, below which are the orange-coloured spiracles. I am not quite certain as to the generic position of the moth, although I ventured to refer it to *Palparia calli-*



Malformed Caterpillar.

morpha Lower. The caterpillar belongs to the very few cannibalistic species found in Australia, and was found in the centre of a mass of "galls" formed by a species of Coccidae of the genus *Sphaerococcus* Maskell, and was subsequently observed feeding upon the adult coccids. Strange to note, this caterpillar could walk, or crawl, with apparently the utmost ease. Has any reader of Science-Gossip ever noticed a similar instance among insect larvae?—James Lidgett, F.E.S., *Myoniong, Victoria, Australia. Feb. 11th*, 1899.

The Marine Water-Glass.—Would you very kindly give me more information respecting the marine "water-glass," such as dimensions and way to make one, which the writer of an article in February number of Science-Gossip refers to as having used at Bermuda?—Robert B. Hansell, 1921, *Linden Avenue, Baltimore, Ma., U.S.A.* [On receipt of Professor Hansell's letter we asked Major Cummins for further particulars. We imagine the instrument will be useful in our home waters as well as abroad. Major Cummins has kindly replied as follows, and sent a sketch for our readers' guidance.—Ed. S-G.] "The enclosed drawing may explain the idea. The sides of the 'water-glass,' which are of wood, are fastened together so as to form a square watertight box, with sides sloping to a narrower end. The glass is inserted in the bottom with white lead. Two patterns are in common use in Bermuda. The first is the native form, in which the opening above is wider than the base. An improved and larger form, with handles at two sides, used by the Royal Engineers, has this arrangement reversed, as shown in the figure. The sides of the box are made of three-quarter inch wood, and the glass is rather strong; the whole weighing from

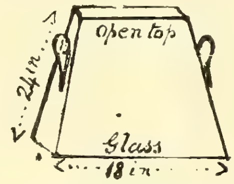


Diagram of Water-glass.

five to ten pounds, according to size. The best dimensions are those given in the sketch, viz., about 24 inches from top to bottom and 18 inches across the bottom. As stated in my article on Bermuda, the object of the water-glass is to get rid of the surface ripple on the sea, and to obtain, to a depth of several fathoms, an uninterrupted view of the animals below. If the glass bottom gets misty or clouded by moisture on the upper side, a little water run over it makes the glass quite clear again. I may add that I have succeeded in taking photographs through a water-glass of a coral reef at a depth of several feet. It will be found a generally useful appliance for students of marine flora and fauna.—H. A. Cummins."

Parasite of Humble Bees.—The parasites your correspondent, Mr. F. Noad Clarke, mentions (*ante* 343) as having found in such numbers on a humble bee, were not, as he supposes, the mite *Gamasus coleoptratorum*, but quite a distinct species named by Berlese, *Poecilochirus fucorum*, regarding which he says "nympha est coleoptrata (cuius speciei)?" Both these and the *G. coleoptratorum* that infest the dung beetle are nymphal or immature forms. The adult form of *G. coleoptratorum* is well known, but this is not the case with the other. For some years past I have kept both species, and have always found *G. coleoptratorum* to become adult in May, and then after a week or ten days they have sometimes laid eggs from which were soon hatched small white six-legged larvae, which in due time changed to the ordinary nymphal forms. Those from the humble bee on the other hand have always died without reaching the adult stage, though I have caught and kept them in confinement at all seasons of the year, and although some have survived for more than twelve months, none ever passed out of the nymphal stage. These nymphs are superficially very much alike, so that a short description of one might apply equally well to the other, but among minor points in which they differ, there is one, viz., the form of the mandibles is so different as to render a mistake impossible. I have reared other species of the Gamasidae, which in their nymphal forms are not unlike the above, and that have gone through all their changes and left, in from six weeks to two months, a second generation.—Linley Blathwayt, Lieut.-Col., F.L.S, *Batheaston, Bath.*

CONDUCTED BY FRANK C. DENNETT.

1899. May		Rises. h.m.	Sets. h.m.	Position at Noon. R.A. h.m.	Dec. ° ′
Sun	7	4.23 a.m.	7.29 p.m.	2.57	16 50 N.
	17	4.7	7.45	3.36	19 21
	27	3.55	7.59	4.16	21 19

May		Rises. h.m.	Souths. h.m.	Sets. h.m.	Age at Noon. d. h. m.
Moon	7	2.55 a.m.	9.57 a.m.	5.16 p.m.	27 5 39
	17	11.11	6.10 p.m.	0.38 a.m.	7 18 21
	27	10.35 p.m.	1.42 a.m.	5.39	17 18 21

	May	Souths. h.m.	Semi-Diameter. ″	Position at Noon. R.A. h.m.	Dec. ° ′
Mercury	7	10.21 a.m.	4·3	1.21	5 18 N.
	17	10.22	3·5	2.2	9 7
	27	10.40	3·0	2.59	14 47
Venus	7	9.48 a.m.	6·5	0.49	3 20 N.
	17	9.53	6·2	1.33	7 48
	27	9.59	6·0	2.19	12 2
Mars	17	5.29 p.m.	3·0	9.9	18 9 N.
Jupiter	17	10.22	20·3	14.4	11 6 S.
Saturn	17	1.48 a.m.	8·4	17.26	21 43 S.
Uranus	17	0.40 a.m.	1·9	16.18	21 17 S.
Neptune	17	1.51 p.m.	1·2	5.32	22 2 N.

MOON'S PHASES.

		h. m.			h. m.
3rd Qr.	May 2	5.47 p.m.	New	May 9	5.39 p.m.
1st Qr.	„ 17	5.13	Full	„ 25	5.49 a.m.
3rd Qr.	„ 31	10.55			

In perigee May 1st, at 9 p.m., distant 229,800 miles; in apogee on 16th, at 9 a.m., distant 251,200 miles; and again in perigee on 28th, at 7 a.m., distant 227,200 miles.

CONJUNCTIONS OF PLANETS WITH THE MOON.

				° ′
May 7	Venus*	5 a.m.	planet	7 17 S.
„ 7	Mercury†	10 p.m.	„	8 22 S.
„ 16	Mars*	7 p.m.	„	5 41 N.
„ 23	Jupiter	2 a.m.	„	6 4 N.
„ 26	Saturn*†	0 noon	„	2 13 N.

* Daylight. † Below English horizon.

THE SUN should be watched, as fine spots sometimes make their appearance.

MERCURY is a morning star reaching its greatest western elongation, 26° 4′, at 4 a.m. on May 10th but it is not in a good position for observation, rising little more than half an hour before the sun.

VENUS is also a morning star, only a few degrees west of Mercury, and rises all the month about an hour before the sun.

MARS is now very tiny and should be looked for as soon as it is dusk, as it souths early in the month nearly an hour and a half before sunset. Its path extends from near γ Cancri into Leo.

JUPITER is in as good a position as its south declination will permit, being not far from κ and λ Virginis. The remains of the red spot should be looked for. It will be situated near the central meridian on May 6th, at 10.22 p.m.; 11th, at 9.29; 18th, at 10.13. Other times of transit can easily be found, its rotation period being 9h. 55m. 41.8s.

SATURN rises at 10.47 on 1st, and about 8.40 on 31st. It is almost stationary close to the place of the new star 1604.

URANUS is in opposition at 2 p.m. on May 27th, and is therefore at its best for observation.

NEPTUNE is too close to the sun for observation.

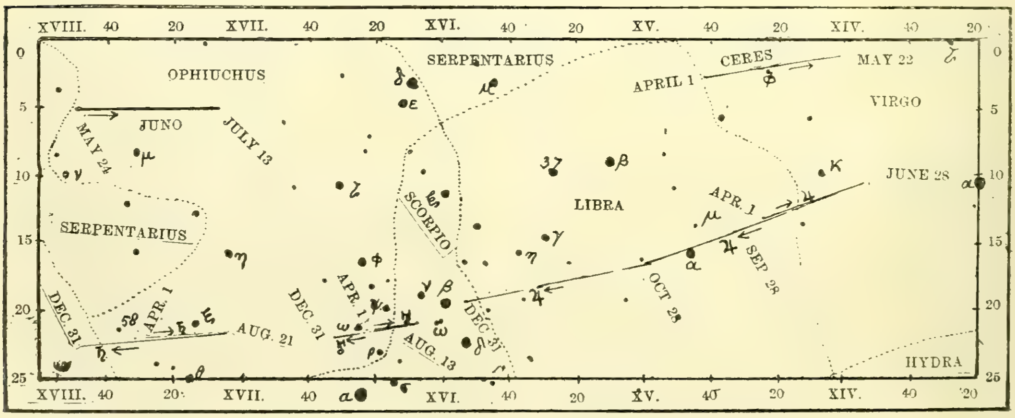
METEORS may be looked for specially on May 2nd, 4th, 15th, and 31st.

COMET *a*, 1899, (*Swifts*), which was round at the time of discovery, about 7′ diameter, and having central condensation, with a short tail, will be seen in the early-morning skies during May. It passed the perihelion on April 13th, but will be nearest to the earth early in June.

COMET *b*, 1899 (*Tuttle*), was first seen by Méchain in 1790. Tuttle observed it at Cambridge, U.S. in 1858; its period is 13¾ years, and it has been seen at each visit since. The perihelion passage should occur on May 14th.

OCCULTATIONS OF STARS.

May.	Star.	Magni-tude.	Dis-appears. h.m.	Angle from Vertex. °	Re-appears. h.m.	Angle from Vertex. °
24	B.A.C. 5254	5	10.15 p.m.	138	11.25 p.m.	264
26	7 Sagittarius	5	11.39 p.m.	69	12.39 p.m.	312



PATHS OF PLANETS TO DECEMBER 1899.

New Minor Planets.—On March 2nd and 3rd, two new pigmy planets were recorded on Professor Max Wolf's photo-plates at Heidelberg. On March 9th Dr. J. Palisa, at Vienna, made his 83rd discovery of a minor planet.

Saturn's New Moon appears on four photographic plates exposed under the new Bruce photographic doublet, 24 inches aperture, and 160 inches focal length. The exposures took place on August 16th, 17th, and 18th, 1898, and each lasted about two hours. The number of stars shown on each plate are about 100,000. The plates were examined by two of them being superposed in such a manner that each star appeared double. Then it was found that each plate showed a minute solitary dot, whose motions were related to those of the planet. By a slip of the pen, on p. 333, Lowell Observatory at Flagstaff, Arizona, was confounded with Harvard College Observatory, at Cambridge, Massachusetts. The observatory at Arequipa, in Peru, is connected with Harvard.

New Star.—In examining some of the Draper Memorial Photographs, Mrs. Flemming has disdiscovered that on March 8th, 1898, there was a new 5th magnitude star in Sagittarius, which on April 29th had fallen to 10th magnitude. Its spectrum showed fourteen bright lines, six of which were due to hydrogen.

CHAPTERS FOR YOUNG ASTRONOMERS.

By Frank C. Dennett.

CHOICE OF A TELESCOPE.

(*Continued from page* 347.)

The figure in the next column is that referred to last month on page 347. Full particulars, with prices, may be obtained from the makers, Messrs. W. Banks and Co., 18, Corporation Street, Bolton.

In advising the use of the reflector, I would emphasise that the silver-on-glass Newtonian pattern is intended.

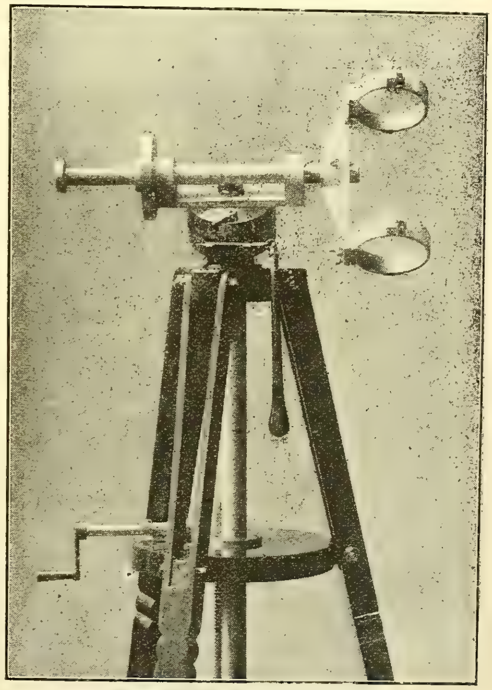
To test an achromatic telescope turn it on a bright star, and remove the eyepiece. If there are defects in the glass, or in the figuring, they will usually show themselves in the unequal illumination of the object-glass. Next put the highest power eyepiece upon the instrument. The star should come sharply in and out of focus. In appearance it should present a tiny circular disc, without wings or other appendages, except one or two thin diffraction rings truly concentric with the tiny disc. Sir James South once wrote: "When about to buy my large object-glass (¹) in Paris, in 1829, I directed it to Aldebaran, viewed it in the telescope, certainly not one minute, and paid for it the next, without any one of the astronomers of Paris then present, and by my side, imagining I had even had the telescope on the star, much less that I had purchased it in consequence."

There is one star. δ Cygni, which is a very good test of the defining power of any telescope from 4½ to 6½ inches aperture, owing to the fact that its companion falls on one of the diffraction rings surrounding the larger star. It is a 3rd magnitude star with an 8th magnitude companion, distant 1·75″, situated R.A. 19 h. 41·8 m., dec. 44° 53′ N. These star tests are suitable for either refractors or silvered reflectors.

(¹) 11¾ inches aperture and nearly 19 feet focal length, made by Cauchoix, now mounted in the Dunsink Observatory, Dublin.

Next turn the instrument upon a double star nearly as close as it may be expected to divide, and take note of its performance. Here is a list of such objects.

Aperture. ins.	*Star.*	*Distance.*	*R A. h. m.*	*Dec.*
2	... ϵ^1 *Lyrae*	... 3·0	... 18 41·0	... 39.34 N.
	... γ *Leonis*	... 3·63	... 10 14·4	... 20.22 N.
2¼	... ε *Böotes*	... 2·7	... 14 40·6	... 27.30 N.
	... ϵ^2 *Lyrae*	... 2·5	... 18 41·1	... 39.30 N.
2½	... ι *Leonis*	... 2·53	.. 11 18·7	... 11.5 N.
2¾	... ζ *Ursae Major*	... 1·94	... 11 12·9	... 32.6 N.
3	... 12 *Lyncis*	... 1·8	... 6 37·3	... 59.33 N.
3½	... λ *Ophiuchi*	... 1·4	... 16 25·8	... 2.12 N.
4	... ε *Arietis*	... 1·34	... 2 53·5	... 20.56 N.
4½	... 36 *Andromedae*	... 1·18	... 0 50·1	... 23.2 N.
5	... η *Orionis*	... 1·0	... 5 19·4	... 2.29 S.
6½	... ω *Leonis*	... 0·84	... 9 23·1	... 9.30 N.



Banks' Equatorial Head and Stand.

To test a telescope for achromatism, the moon's limb, or edge, Jupiter, or Venus are best. A reflector shows no colour round the limb, but nearly all achromatics do so, the blue colour being indicative of the better objectives. It will always be found, however good is the performance of a telescope on double stars, that those of longer focus will have the advantage for planetary work.

Amongst English-made object glasses, those of Cooke (Taylor's patent), Wray, and (the late) T. H. Dallmeyer take the lead. M. Bardou, of Paris, also sends some splendid objectives into the market. For silver-on-glass reflectors, those of the late G. With, G. Calver, W. Harding and Linscott may be selected with dependence.

(*To be continued.*)

Erratum.—In the last sentence on p. 347, for "0·9 inch" read "0·9″."

GEOLOGY

CONDUCTED BY EDWARD A. MARTIN, F.G.S.

Geology of the Isle of Portland and Weymouth.—A Memoir of the Geological Survey, dealing with the Isle of Portland and Weymouth, has been published. Mr. A. Strahan is the author, and the work is issued at ten shillings and sixpence.

Othniel Charles Marsh. — The eminent American geologist, Othniel Charles Marsh, Professor of Palaeontology at the University of Yale, died on the 18th March. He was M.A. of Yale, Hon. Ph.D. of Heidelberg and LL.D. of Harvard University, an F.G.S. of London and first recipient, in 1877, of the Bigsby Medal. He was awarded the Cuvier Prize in 1887 by the Institute of France in honour of his restorations of extinct reptiles, birds and mammals. In 1879 Dr. Marsh delivered a remarkable address on "The History and Method of Palaeontological Research," whilst President of the American Association for the Advancement of Science. In 1882 he was appointed Director of Palaeontology to the U.S. Geological Survey, and a year later Curator of the Vertebrate Fossil Collection in the National Museum at Washington.

Rocks of the Essex Drift.—When the Rev. A. W. Rowe collected and examined the rocks and boulders scattered around the village of Felstead, near Braintree, in Essex, he found a most remarkable and varied amount of material to choose from. Felstead stands on high ground overlooking the River Chelmer. Within a radius of four miles of the village he found stones and boulders of the following rock species: granite, syenite, quartz - porphyrite, quartz - tourmaline, felsite, quartz - trachytes, felspar - porphyrites, trachytes, and dolerite. In the quartz-tourmalines, which seemed very abundant, the ground mass was granitic, and contained schorl in abundance. It sometimes occurred as needles in other crystals, or in aggregates in other grains; sometimes in spheroidal patches, or in appearance of thin threads.

Schorl Rock in the Drift.—The distribution of this rock over the south of England was dealt with in a paper before the Geological Society, on February 1st, by Mr. A. E. Salter, F.G.S. Specimens which he collected were referred to Professor Bonney, who identified the parent rocks as the felspathic grits of the south-west of England. The most westerly point at which the pebbles have been detected is on Great and Little Haldon Hills, eight hundred feet above O.D., where they are of larger size, more abundant, and coarser-grained than elsewhere. Thence they are traced to the north and south sides of the Thames Basin, and into East Anglia at Walton-on-the-Naze, Aldeburgh, &c. There is a general decrease in height in the deposit in which the pebbles occur in passing from west to east, and the pebbles appear to have taken two main courses—one along a peneplain west to east from Dartmoor, the other from south-west to north-east across England. The pebbles are absent from the Wealden and Bagshot areas, from the Hampshire Basin and its bounding hills, and from the highest and presumably oldest gravels north of the Thames.

Barton Clay Fossils.—Fossils from the Barton Clay of Hampshire have always had a great fascination for the geologist collector because of their beautiful state of preservation. We have received a box of thirty different species from Mr. R. Charles, the veteran who, in his seventy-second year, still finds enjoyment and healthy employment in collecting the fossils which he is now offering our readers. His prices are so extremely moderate that one cannot understand how it can be worth his while, excepting as a labour of love, and the endeavour to diffuse a knowledge of these representatives of Upper Eocene times. Mr. Charles has received testimonials from University College, Bangor; Owens College, Manchester; Royal College of Science, South Kensington, &c. No collection of specimens is complete without one of these series, now that they are brought within reach of the youngest collector.

Brighton Cliff Formation.—Owing to fresh falls in the cliffs to the east of Brighton, the face presents for a quarter of a mile, a new section of the Brighton cliff formation. No less than ten feet of well-rounded gravel and boulders now rest horizontally upon a low cliff of chalk which rises from the present beach to about ten feet. The largest boulders of flint are in the base of the raised beach, and the change downward is an abrupt one into chalk *in situ*. There is now no sand between the two, and there is no layer of green-coated flints at the junction. The gravel just rests on a platform of chalk. As one reaches the eastern boundary of the formation, the beach instead of being continuous from top to bottom, splits up into a top and bottom layer of about a foot thick each; whilst the space between them is filled with "reconstructed chalk" in which the boulders increase in size easterly, until the whole presents an appearance of chalk, almost as originally laid down, with the usual joints and cracks. The lower part of the Elephant bed, which rests upon the topmost gravel, becomes more chalky in an easterly direction, and is made up of rounded fragments of chalk, together with larger boulders of the same. Owing to the manner of the falls, the cliff has been cut back more in some parts than in others, with the result that the lines of stratification, which are everywhere most distinct, appear to dip at a high angle towards the sea. It is just possible that these lines may be due to current-bedding; in which case it would seem to follow that much of the upper portions of the Elephant bed are missing, having been planed away with the upper part of chalk at its rear. Great masses of red sandstone, grey sandstone, and here and there a mass of tertiary iron-red breccia, strew the feet of the cliffs. In the raised beach I excavated from just above the chalk two rounded boulders of granite, and a few rounded laminae of green Woolwich sandstone. Probably 99 per cent. of the stones were flints, with little or no sand in the interstices.—Edward A. Martin.

MICROSCOPY

Departmental Editor.—We have much pleasure in announcing that Mr. F. Shillington Scales, F.R.M.S., of Sunderland, has kindly undertaken to conduct the Microscopy columns in Science-Gossip, as Honorary Departmental Editor of that section of science. As the first number of Volume VI., new series, is due next month, Mr. Scales will commence his duties with the June part. We trust our readers will give Mr. Scales their best support, as they may depend on his exact knowledge of the subject, and we know he intends to make the department as attractive and helpful as possible. All communications are to be addressed to the office, 110, Strand, London, W.C.

A "Circulating Library" of microscopical and lantern slides is being arranged in Manchester by Mr. Abraham Flatters, of 16-18, Church Road, Longsight. It is expected to be ready for the next Winter season.

Unmounted Material.—Mr. Frank P. Smith, of 15, Cloudesley Place, Islington, London, N., has sent us a packet of unmounted material which, being surplus stock, he is offering free on receipt of stamped envelope. Many of our readers who are beginners in the art of mounting objects for the microscope, an art that everyone who uses the instrument must acquire sooner or later, may be glad to take advantage of Mr. Smith's offer.

Illumination for Opaque Objects.—It may not have occurred to some of our readers whose microscopes are fitted with swinging tail rods for their mirrors, that by swinging the tail-rod close up beneath the stage and then turning the mirror upright and focussing its concave face upon the object, most brilliant and satisfactory illumination can be gained, superior even to the side silver reflector. It is, of course, necessary not only that the tail-rod should swing at least 180 degs., but also that it should be circular, that the mirror fillings may revolve upon it. Messrs. Watson's "Edinburgh" stand is a good example.

Substitute for Stage Forceps.—Good stage forceps are a somewhat expensive item in a microscopical outfit, and are difficult to use without practice. A useful substitute may be made by fixing a cube of cork about three-eighths of an inch square in the centre of a 3 by 1 slip. Any of the ordinary cements as used by microscopists, or Prout's elastic glue, answers capitally for fixing. A thin pin should be run through the object to be shown, and may then be inserted in either of the sides of the cork cube in succession, thus showing each aspect of the object with various directions of illumination. With small flowers, insects, fungi on leaves or twigs, &c., which it may be desired to exhibit to friends, this apparatus will be found to have many advantages over the forceps, not the least being its non-liability to move with inexperienced handling.—Jas. Burton, 39, *Ingham Road, West Hampstead.*

Zoophyte Troughs.—Though necessary, especially where pond life is a favourite subject, these troughs often give trouble by leaking and breakage. A cheap and efficient form may be made as follows: Take a square of indiarubber as sold by stationers for erasing purposes, and cut a strip about three-sixteenths of a ninch wide from three sides; these should be fastened to a glass slip with Prout's elastic glue; a piece of glass cut from another slip, a thin one preferably, to fit the square thus formed is then to be secured above the indiarubber, and if done carefully a neat and sound joint will result. The trough may be repaired readily at any time by warming over a lamp and gently pressing the top glass into place. One of the common wheel glass-cutters is all that is required to cut a slip for the front of the trough. By using thicker rubber and larger glasses, troughs may be constructed in which various organisms may be kept for a considerable time, and their development conveniently watched. —Jas. Burton, 39, *Ingham Road, West Hampstead.*

Micro-photography.—I have to thank Mr. F. Noad Clark for his courteous reply to my enquiry (*ante.* p. 316) as to photographing objects too large for the field of the microscope. Before seeing it I had experimented somewhat on the lines he suggests, with results that may possibly be of interest to some of your readers. I found that by using the objectives belonging to my microscope in conjunction with the R. R. lens of a photographic camera, results were obtainable at least as good as with Planar lens, and enclosed you will find a print of each for your inspection. The objectives were carried by a simple adapter, which fitted on the flange of the R.R. lens at one end, and at the other was supplied with a universal screw to fit any objective. The following advantages, independently of the cost of the Planar lens, were obtained: (1) A longer working distance between the lens and the object; (2) Easier manipulation of the iris diaphragm of the R. R. lens as compared with the smaller one attached to the Planar lens; (3) Greater variety of magnifications obtainable by using various objectives. The Planar lens gave two magnifications with the same extension of the camera (the lower one being obtained by removing one of the lenses), viz., 4 and 6 diameters, and by extension of the camera these could be increased up to 5 and 8 diameters. With the R.R. camera lens and Watson's parachromatic objectives, the following approximate magnifications were obtained: R.R. lens and 4-inch objective, from $3\frac{1}{2}$ to $4\frac{1}{2}$ diameters; R. R. lens and 2-inch objective, from $5\frac{1}{2}$ to $7\frac{1}{2}$ diameters; R. R. lens and 1-inch objective, from 10 to 12 diameters; R. R. lens and $\frac{1}{2}$-inch objective, from 18 to 24 diameters. With the 4-inch objective the actual working distance was two inches, and the camera extension 16 inches; and distance between R.R. lens and objective, 2 inches. It is possible that greater care may be requisite than when focussing with the Planar lens, but the difference was scarcely noticeable; and where economy is a material consideration, the simple combination suggested must mean a considerable saving to those who already possess a microscope and ordinary camera, but no special lenses for objects of these sizes.—E. G. Wheeler, *Swansfield House, Alnwick.*

COUNTRY LORE

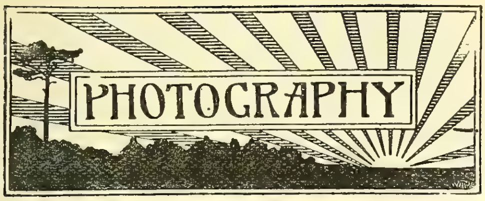
Foxglove for Consumption. — Early this year I happened to find an old volume entitled "The Medical and Physical Journal, containing the earliest information on subjects of Medicine, Surgery, Pharmacy, Chemistry, and Natural History, conducted by T. Bradley, M.D., and A. F. M. Willich, M.D., March to July, 1799, printed for R. Phillips, No. 71, St. Paul's Churchyard." On glancing over the old tome, I could not avoid being struck by the similarity of the topics under discussion in 1799 to those of 1899. I found ample confirmation of the trite saying that "History repeats itself." As in 1899, vaccination, then recently introduced, and consumption appear to have been two very prominent subjects of discussion. The theories regarding "cow-pox" afford entertaining reading in the light of the present day; and the editors having received an article from Dr. Pearson, remark that it "shows how rapidly the practice of inoculation increases." Current literature of our times discloses an ebbing rather than a flowing tide. A few years before the birth of this "Medical and Physical Journal," Withering, the well-known botanist, had introduced the foxglove (*Digitalis purpurea*) to the notice of the profession, and it appears to have soon assumed an important place as a remedial agent in the Materia Medica of the day. It was destined to have still higher powers claimed on its behalf. On the 21st of February, 1799, Dr. N. Drake, of Hadleigh, Suffolk, announced the virtues of *Digitalis* as a specific for the cure of consumption, and the editors congratulated him "on the happy success of this remedy, in conquering the most formidable, and hitherto supposed invincible disorder." It may be observed that Dr. Drake attributed this disease to "an ulcer of the lungs, perpetually exposed to a stream of air, and of course an ichorous poison continually forming, by union of oxygen with secreted matter." According to Dr. Drake's theory, the patient was poisoned by the virus resulting from the oxidation of the secretion from these ulcers. Note what a revolution has occurred in the hundred years that have elapsed since this was written. Now, instead of being a factor of causation, oxygen, in the shape of fresh air, is called upon to cure the disease. The next paragraph from the same author of 1799 would admirably wind up many eloquent discourses of 1899—"The least considerate must perceive that if the subsequent harvest correspond to the first fruits, there is a cause for national rejoicing, greater and more universal than has ever before occurred." But, alas! the harvest was a failure. Other plants I find recommended in my old "journal" to be used in the cure of consumption are broom, lake-weed (*Ranunculus aquaticus*), and fennel. These are now relegated to the pharmaceutical dust heap. What will be thought of the fresh air system of cure in 1999? We can only hope that the promise of the present may have richer fulfilment than that of the past.—J. A. Wheldon, *Walton, Liverpool.*

BOTANY

A Grass New to Ireland.—In the *Irish Naturalist* for March, Mr. John Adams records the addition of *Hordeum sylvaticum* to the Irish flora. He found it near Carnlough, co. Antrim, in July last. It has already appeared in Cybele Hibernica, but as an alien.

Pinnate Sepals of Rosa Canina.—I am much obliged to Mr. R. R. Hutchinson (*ante* p. 220) for the ingenious explanation of the reason for the curious interrupted pinnate sepals in *Rosa canina*, &c., which is probably the correct one; but I cannot see why the overlapping, or otherwise, of the sepals in the bud should have that effect. Why, if the sepals themselves can develop as to their edges, when overlapped, should not the appendages also? If the much more delicate parts inside—the corolla, stamens, and pistil—can develop inside all, surely these lobes might, even though overlapped. Is not a probable reason to be found in the fact that they are not needed on those sides, the overlapping supplying their place in tightening the embrace of the sepals, the supposition being that their use is the closer compression and tighter fastening of the calyx for the greater protection of the flower within? If that be so, the question remains: why are these lobes needed at all? Why more needed in *Rosa canina* and allies than in other plants? The calyx would surely be secure enough without these extra fastenings.—*A. E. Burr, Bath; December 15th*, 1898.

Agaricus Sylvaticus near Liverpool.—Early in January last, a friend residing in Highfield Road, Walton, informed me that his drawing-room was pervaded by an unpleasant odour, for which he could not account. It gradually became worse, until the room became uninhabitable because of the unwholesome stench, which was said to be like that of putrid flesh. Thinking that the unpleasant scent proceeded from the decaying carcase of a defunct rat, my friend secured the services of a carpenter to take up the floor and eject the remains of the obnoxious rodent. Beneath the boards adjacent to the hearthstone was discovered a mass of rotting fungi, a pound or two in weight. In order to ascertain the name of his unwelcome visitor, my friend brought an unsavoury lump to me. As I could not identify it, I sent it to Kew, and the authorities there very kindly determined it to be *Agaricus sylvaticus*. Interesting speculation may be indulged in as to the origin of this occurrence. Did the fungus spring from spores lying dormant in the soil beneath the floor, or from mycelium permeating the boards? In either case, why should they only now appear, after the house has been standing twenty years or more? No woods are known to have existed on the site, such as would form a suitable habitat for a sylvestral plant. Perhaps some reader of Science-Gossip who has studied the fungi will kindly suggest a reason for this invasion of an English hearth and home.—J. A. Wheldon, 60, *Hornby Road, Walton, Liverpool.*



ANIMATED PICTURES AT HOME.

The scientific, as well as the artistic, side of photography advances with rapid strides. By a new invention, we amateur photographers may prepare our own animated pictures, and show them in a friend's drawing room, on the evening of the day on which happened the event represented. Neither need the picture be amateurish, for the machine is prepared to do its work perfectly, with all the accurate detail of the big exhibitions given in places of public amusement. This remarkable instrument is named the Biokam from the Greek words *bios* life and *kamara,* meaning literally a living camera. As the Biokam will not be available for purchase until after this number appears, we have been favoured with advance particulars. Not that the invention is unknown, for we are informed orders for upwards of a thousand of them have already been given. This we can understand, after an examination of the Biokam, as without more outlay than the cost of an ordinary photographic camera, we obtain that instrument arranged for taking moving pictures, also the apparatus for printing them, and finally the Biokam itself, for throwing the image on a six-foot screen. We have been favoured with a couple of drawings by the proprietors of the Biokam, who are the Warwick Trading Company, Limited, of London. Fig. 1 shows the complete instrument for taking the transparent film-pictures, printing and projecting them, together with the film-boxes, lenses, etc.; while fig. 2 shows the the projector only, detached from the film storage-

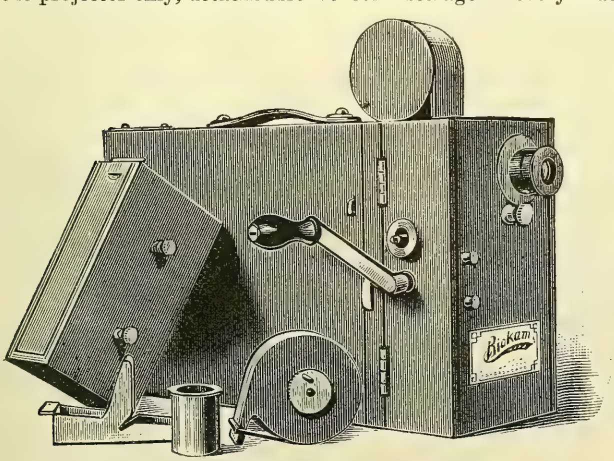


FIG. 1.—The Biokam. Complete Outfit.

box. This latter portion can be screwed into the lens-flange of any ordinary lantern. The whole Biokam and accessories pack away into a box $9\frac{1}{2}$ in. long, $3\frac{1}{2}$ in. wide and $5\frac{1}{2}$ in. high, weighing with the case only $3\frac{1}{4}$ lb. Hitherto the difficulty of obtaining animated pictures to show to one's friends has been almost prohibitory, on account of the large size of the room required to show the pictures, and the great cost of the instrument and films. This practically placed the subject beyond the reach of amateurs as a body. Now, this has been entirely overcome by the Biokam. One of its greatest recommendations is the simplicity of the apparatus. It requires little special knowledge to take a picture, print and develop the films and throw the moving image on a screen. The proprietors supply all the necessary materials, with ample illustrated instructions for their use; the whole forming the special arrangements for taking the necessary photographs, and a projection cinematograph for exhibiting them. Any intelligent lady or gentleman may thus bring back a series of incidents taken on a holiday trip, that are infinitely more expressive and entertaining than the most elaborate descriptions. Neither can they err on the side of the narrator, for they show on the screen exact representations of what took place. The camera portion of the Biokam may be used for taking midget photographs, of every description, with a minimum of trouble. These may be printed on paper in the usual way, or they make good lantern slides. Small pictures taken in this manner are also suitable for enlargement, the apparatus lending itself to this purpose. The company supplies rolls of films, already prepared for action. These may be developed and used in the cinematograph, with very little trouble, as the details and implements have been well thought out. It is now quite an easy matter for the amateur to proceed with this new and pleasurable form of photography. So many uses for the aid of the Biokam suggest themselves for science work generally, that we feel sure that many of our readers will soon avail themselves of the help to be given by this remarkable little apparatus

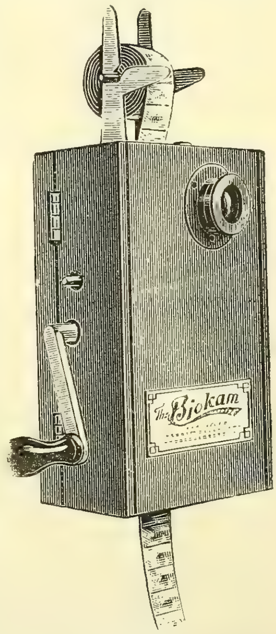


FIG. 2.—The Biokam. Projection portion.

It is difficult to imagine to what extent this new form of photography will affect our daily lives. May it not be possible to have living pictures as illustrations to ephemeral literature?

NOTICES OF SOCIETIES.

*Ordinary meetings are marked †, excursions *; names of persons following excursions are of Conductors. § Lantern Illustrations.*

GEOLOGISTS' ASSOCIATION OF LONDON. *Excursions.*

May 6.—Thame District. A. M. Davies, B.Sc., A.R.S.M., F.G.S.
,, 13.—Ilford.
,, 18-24.—Brittany: St. Malo, Rennes, &c. C. Barrois, D.Sc.
,, 22&23.—Cycling Excursion. Rev. Prof. J. F. Blake, M.A., F.G.S.
June 3.—Redhill.
,, 10.—Rickmansworth and Harefield. W. Whittaker, B.A., F.R.S., Pres. G.S.
,, 17.—Excursion. Prof. C. Lapworth, LL.D., F.R.S., and Prof. W. W. Watts, M.A., F.G.S.
,, 24.—Brighton. H. Edmunds, B.Sc.
July 1.—Medway Valley. G. E. Dibley, F.G.S., and A. E. Salter, B.Sc., F.G.S.
,, 15.—Guildford.
,, 22.—Cycling Excursion.
Aug. 3-9.—Derbyshire: Peak Forest—Headquarters at Matlock Bath. One night at Castleton. H. Arnold Bemrose, M.A., F.G.S., Dr. Wheelton Hind, F.G.S., and J. Shipman, F.G.S.

Frederick Meeson, Chairman, Excursions Committee, 29, Thurloe Place, South Kensington, S.W.

NORTH LONDON NATURAL HISTORY SOCIETY.

May 4.—†"Comets and Meteors." C. Nicholson, F.E.S.
,, 18.—†"Notes on Tour in Swiss Alps." C. B. Smith.
,, 19-22.—*New Forest. C. Nicholson, F.E.S.
,, 22.—*Cuxton. L. B. Prout, F.E.S.
,, 27.—*Epping Forest. L. J. Tremayne.
June 1.—†"Some Old Microscopists and their Work." W. H. Barber.
,, 15.—†"Evolution of Scenery." R. W. Robbins.
,, 24.—*Chesham. L. B. Prout, F.E.S.

SELBORNE SOCIETY—CROYDON AND NORWOOD BRANCH.

May 20.—*Purley Down.
June 17.—*Merstham and Caterham.
July 15.—*Reigate Heath.
Aug. 19.—*Belmont, Woodmansterne, and Chipstead.
Sep. 16.—*Mitcham Common to River Wandle.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

May 11.—†Lantern Demonstration. J. W. Tutt, F.E.S.
,, 27.—*Field Meeting at Chatham. Mr. Walker, R.N., F.E.S.
June 10.—*Field Meeting at Byfleet.
July 15.—*Field Meeting at Wisley, *via* Effingham.

Hy. J. Turner, Hon. Report Sec.

HULL SCIENTIFIC AND FIELD NATURALISTS' CLUB.

May 3.—†Microscopic Evening.
,, 13.—*Rudston. Monolith, &c. J. R. Boyle, F.S.A.
,, 17.—†"East Riding Folk, Past and Present." Paul Davies.
,, 22.—*Froding and Broughton.
,, 31.—†§"Plant Evolution." F. Lawson.

NOTTINGHAM NATURAL SCIENCE RAMBLING CLUB.

May 6.—*Geological Section. Lenton to Beeston. J. Shipman, F.G.S.
,, 20.—*Botanical Section. Ruddington and Clifton.

Hon. Sec. W. Bickerton, 187, Noel Street, Nottingham.

IMPORTANT NOTICE.

THE Proprietor of SCIENCE-GOSSIP having decided to manage the business department from an independent office at 110, Strand, London, W.C., all subscriptions, advertisements and payment for advertisements must in future be sent to that address, and no longer to the Nassau Press, which latterly managed the commercial department for the proprietor.

This being the index number, several communications unavoidably stand over from lack of space.

Subscriptions (6s. 6d.) for Vol. VI. are now due. The postage of SCIENCE-GOSSIP is really one penny, but only half that rate is charged to subscribers.

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

BUSINESS COMMUNICATIONS.—All Business Communications relating to SCIENCE-GOSSIP must be addressed to the Proprietor of SCIENCE-GOSSIP, 110, Strand, London.

SUBSCRIPTIONS.—Subscriptions to SCIENCE-GOSSIP, which may commence with any number, at the rate of 6s. 6*d*. for twelve months (including postage), should be remitted to the Office, 110, Strand, London, W.C.

EDITORIAL COMMUNICATIONS, articles, books for review, instruments for notice, specimens for identification, &c., to be addressed to JOHN T. CARRINGTON, 110, Strand, London, W.C.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date, and particulars of capture.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

OFFERED, Dixon's "Geology of Sussex," Kirby and Brady's "Fossil Entomostraca," Murchison's "Siluria," Morris' "Fossils," "Memoirs of Geological Survey." Wanted, Exotic Helicidae, or books of travel."—Miss Linter, Saville House, Twickenham.

"SCIENCE-GOSSIP," 11 vols., from commencement, original binding; and entomological books. Wanted, "Sowerby's Illustrated Index of British Shells." "Journal of Conchology."—C. S. Coles, Hoe Moor House, Hambledon, Hants.

HAIR OF INDIAN BAT and Crystals of Strychnia, &c., for other well mounted slides or material. Lists to W. H. Reid, 22, Shaftesbury Street, Stockton-on-Tees.

SUNDEWS: Wanted, living plants of either of the British sundews, early as possible in Spring.—A. H. Nicholson, Carlton House, Greenbank, Darlington.

MAHOGANY CABINET with 44 drawers, cost about £14. What offers? Also wanted foreign shells, echinoderms, crustacea, &c. Exchange other shells, fossils, American minerals, canaries, &c.—H. W. Parritt, 8, Whitehall Park, N.

WANTED, a chemical balance and a half-plate camera and lens for cash or exchange. Offered, a fine set of Neolithic Celts (Lincolnshire), Mediterranean land shells (named), and a lot of current entomological literature.—J. H. Cooke, 19, Ravenswood Road, Redland, Bristol.

WANTED.—Good specimens only, of genus Epipactis, except C. palustris, from all parts of Britain. Rare, critical, or other species in return.—Arthur Bennett, 143, High Street, Croydon.

FINE AMMONITES, Minerals, and a few good Agates offered in exchange for Bronze Implements or Celts, or other Minerals not in collection.—P. J. Roberts, 11, Back Ash Street, Bacup.

TATE'S MOLLUSCA (coloured plates), Prantl and Vine's "Botany," and other scientific books. Offers. Geological lantern slides preferred.—G. H. Corbett, 226, Nechells Park Road, Birmingham.

MICROSCOPICAL slides for exchange. — Walter Pindar, Horninglow, Burton-on-Trent.

WANTED, fossils from all formations, rock specimens. Offer, splendid specimens Coal Measure Ferns, microscopic slides of Carboniferous Megaspores. Correspondence invited. W. Hemingway, 170, Old Mill Lane, Barnsley, Yorks.

ARTICLES, NOTES, ETC.

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